of Any

POPULAR AVIATION

How I (page 23)
into ...YING GAME

THE ... STORY OF
EDDIE ...KENBACKER

My Five ...rs as a (page 71)
PAR... ...UTE JUMPER

See page 32

JULY
25¢

Now

[See page 32, for list of features scheduled for this outstanding issue]

Two Great Magazines combined into ONE. Starting with August Issue. On Sale at all news-stands July 10th . . . . . .

AERONAUTIC PUBLICATIONS OF THE RONALD PRESS COMPANY

Aeronautics

by Hilton F. Lusk, Professor of Aeronautics, Sacramento Junior College; formerly Dean, Boeing School of Aeronautics. 175 illustrations, **$3.25**

From this new ground school textbook you can obtain exactly the information you need to pass the written examinations for a government license as a mechanic or as a pilot in any of the grades, including transport pilot—even if you must study at home without the aid of an instructor. It tells you what you need to know about subjects like these: Principles of Flight, Airplane and Autogiro; Airplane and Autogiro Construction and Operation; Propellers; Engine Construction and Operation; Attitude and Engine Instruments; Maps and Piloting; Dead Reckoning; Avigation Instruments and Equipment; Principles and Applications of Meteorology; etc., etc. 224 questions, like those asked in license examinations, help you test your grasp of each subject.

Building and Flying Model Aircraft

by Paul Edward Garber, Smithsonian Institution. 198 illustrations, **$2.25** *(By mail,* **$2.45**).

A complete course in model building—the *official* book of the Playground and Recreation Association of America, the association carrying the endorsements of Wright, Lindbergh, and Byrd. Provides full instructions for building fifteen types of model aircraft, with data on sixteen others from which models can be built. Large, easily-followed drawings make every step clear. Covers all types of models, wooden and metal parts, propellers, materials, tools, alignment for successful flight, etc., etc.

Airplane Mechanics Rigging Handbook

by R. S. Hartz, formerly Lieut. Colonel, Air Corps, U. S. Army; and Lieut. E. E. Hall, formerly Editor, "Aircraft Servicing." 104 illustrations, **$3.50**

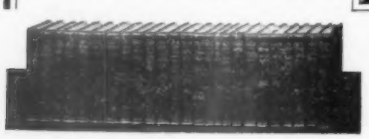
This book tells all about the rigging, maintenance inspection, and repair of airplanes, showing just how to get an airplane into safe flying condition and then keep it that way. The instructions show how each operation should be done, what the proper order is, and the reasons why. Covers fully handling planes on the ground and in the shop; sequence of rigging steps; how to true up the assembled ship; how to adjust the wings and control surfaces for "hands off" flying; the materials of patching, splicing, and repairing of all kinds; practical hints for riggers; installing and correcting compasses, etc., etc.

You Can Order Any of These Books on 5 Days' Approval

You can order any of the books described on this page with the privilege of examination before purchase. Payment is not due until five days after they are delivered; you can return them within that period if you are not satisfied in every respect.

Pay Monthly if You Wish

If your order amounts to $5.00 or over, you may, if you prefer, take advantage of our monthly payment terms. Under this plan you send us each month a payment which will vary with the amount of your order, but will not be less than $2.60 ($2.50 payment plus on each instalment a uniform service charge of 10c), so that your entire account will be paid up within six months from the date of your purchase. Check in the space provided in the coupon if you prefer to divide your payments in this way.



The standard manual for student pilots:

Practical Flying

by Major B. Q. Jones

Air Corps, U. S. Army; Pioneer Pilot; Chief of Army Aviation Training in the World War

THIS famous pilot's manual can save you hours of time and a lot of money in your flying training. It gives you the basic facts that you otherwise would have to learn from long and costly experience. It is so plainly written, so specific and to the point, that any beginner can understand it. There are many suggestions, hints, and explanations in it which even the most experienced pilot will find vitally valuable.

Major Jones has a remarkable record of continuous flying since 1913 in all types of airplanes from the early pusher Wright and Curtiss planes to the most modern military types. He has trained thousands of pilots. During the World War he was the Chief of Aviation Training and made the magnificent record of a casualty rate of one-third that of any of the armies. Experienced airmen endorse this book enthusiastically—they say it contains just the information that is needed to save crashes and lives.

First Major Jones outlines the physical and mental characteristics you should possess if you wish to become a pilot. From this he proceeds to provide clear and concise answers to the hundreds of questions that student pilots have asked for years—information that is essential for a proper understanding of piloting. For much of the detailed information the material is prepared in question and answer form. A variety of practical subjects is covered, such as taxying, the take-off, the initial climb, emergency landings after the take-off, straightaway flight, turns, figures of eight, glides, landings, cross-country flying, stalls and spins, etc., etc. The book is packed with useful facts on planes, instruments, technical expressions, plane parts, pilot's equipment, methods of plane inspection, testing controls and motor and similar practical questions. **Price $3.00**

Gliders and Gliding

by Lieut. Cmdr. Ralph S. Barnaby, Scientific Section, Bureau of Aeronautics, U. S. Navy; First American First-Class Licensed Glider Pilot. 123 illustrations, **$3.00**

A practical handbook for glider flyers and builders. Gives a detailed, progressive course in flight training, with full information about types of gliders, ground and wind conditions, launching, first flight, maneuvering the glider, and landing. Starts with primary instructions and progresses through secondary training to a full course in soaring. Contains useful data on design principles, structural details, materials, assembling, rigging and aligning.

Airplane Stress Analysis

by Alexander Klemin, Director, Guggenheim School of Aeronautics, N. Y. University. 105 illustrations, **$7.00**

An introductory treatise showing step by step how to make all the calculations in the airplane stress analysis required by the Department of Commerce. The book is intensely practical—each point is explained with the utmost clearness and simplicity. A preliminary review explains the principles of applied mechanics involved. Tables giving the stress data constantly needed by engineers on steel, wood, tubing, hard wire, steel cable, tie-rods, rivets, bolts, wheels, tail-loads, etc., are included.

(fill in, tear out, and mail)

"ON APPROVAL ORDER FORM"

The Ronald Press Company,
Dept. M508, 15 East 26th St., New York

Send me the books checked below. I will either return them or send my remittance in payment within five days after the books are delivered.

☐ *Check here to use the monthly payment plan*

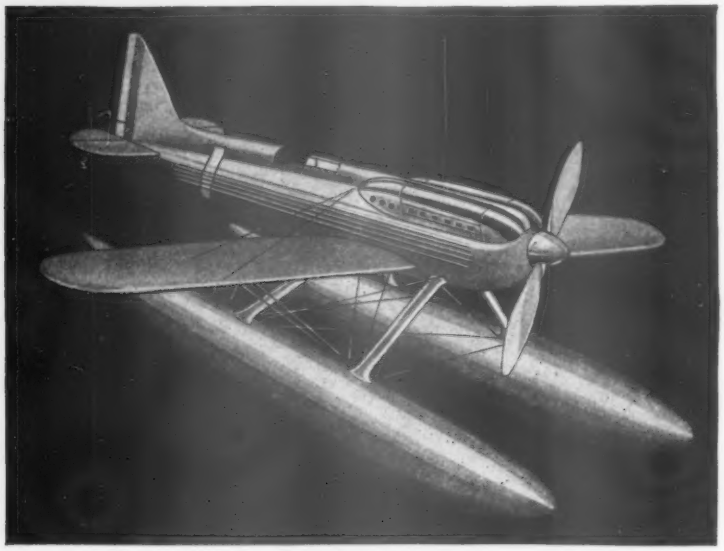
☐ *Jones,* **Practical Flying** **$3.00**	☐ *Hartz-Hall,* **Rigging Handbook** **$3.50**
☐ *Lusk,* **Aeronautics** **3.25**	☐ *Barnaby,* **Gliders and Gliding** **3.00**
☐ *Garber,* **Model Aircraft** **2.45**	☐ *Klemin,* **Airplane Stress Analysis** ... **7.00**

Name .....

Home Address .....

City ..... State* .....
☐ Employed by,
☐ or Reference .....
**If outside continental U. S. and Canada, send cash plus 25c per book for shipping.*

Here's the Model you have been waiting for!



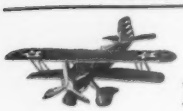
This is a picture of the IDEAL-Designed Model of the Supermarine S.6.B.—Man's Speediest Air Conveyance. Credited with a speed of 408.8 miles per hour. This IDEAL-Designed Model is a faithful reproduction of the fast original; while we cannot claim it will fly like the original, it will give a fine Model performance in the air and is correctly balanced and can be waterproofed for use in smooth water.

—a New Ideal-Designed S. 6. B. SUPERMARINE Flying Model

Complete Kit, postpaid $1.10

HERE'S your chance to build an Ideal-Designed Model of the fastest flyer in the air—the Supermarine S.6.B. This 18-inch wing span Model faithfully reproduces the speedy original in every detail, even to the distinctive fuselage, engine mountings, bottom radiators and landing pontoons; and the beautiful blue and silver colors of the original. This Model has plenty of speed and power and will perform in imitation of its fast original.

The IDEAL Kit contains everything needed to make a perfect job of your Supermarine, and, as usual with all IDEAL Kits, more of the hard, tedious and difficult work is done for you, and you can finish a better Model easier and quicker. This Supermarine Model is made with built-up wings, fuselage and pontoons and all these parts are ready printed on sheet balsa for you to cut out and use. All wire parts are finished and ready for use. Shaped bullet nosing and propeller included. The Kit also contains cement, Model dope, rubber, silk tissue, reed and, in fact, everything you need—there is nothing more to buy to finish your Model. Full Size Plans and complete instructions are also included. Send for your Supermarine Kit now and your Model will be in the air in a hurry. Complete Kit, $1.10 postpaid.



Ideal-O-Craft Miniature Replica Models

6 in. size

1—Curtiss Hawk
2—Gee Bee
3—Laird
4—Pitcairn Autogiro
5—Spad
6—S.E.5

These solid-balsa, hand-carved, 6-inch Miniatures of famous ships have made a tremendous hit. The most beautiful jobs you ever saw; perfect duplicates of real planes, colored and decorated just like the originals. You can make them easily; they're fine for gifts and decorations. 12 different Models to choose from as listed here. Pick yours now and get started right away. Order by name and number.

12 Types

7—Curtiss Hell Diver
8—Supermarine
9—Curtiss Fledgeling
10—DeHavilland
11—Nieuport Biplane
12—Lockheed Vega

Your Choice of Any 2 Kits for 65c
6 Kits for $1.65 12 Kits for $3.00
(PRICES INCLUDE POSTAGE)

MODEL ACCESSORIES

at Money-Saving Prices, from the New IDEAL Catalogue

Steel Type Toothpick Propellers
Die Cast from Metal Alloy

3½ in.	Each	$ .30
5 in.	Each	.35
6½ in.	Each	.40

(Postage: 3c extra)

Stamped Alum. Propellers
1¼ in. diam.

2 Blade	Each	$ .03
3 Blade	Each	.04
4 Blade	Each	.05

(Postage: 1c extra)

Alum. Motor Plates
Designed for 9-Cyl. Motors

⅞ in.	Each	$ .08
1¼ in.	Each	.10
1¾ in.	Each	.12

(Postage: 3c extra)

Alum. Motor Cowlings
Open or Closed Types

1½ in.	Each	$ .20
2 in.	Each	.25
2½ in.	Each	.30
3 in.	Each	.35

(Postage: 3c extra)

Anti-Drag Rings

1½ in.	Each	$ .20
2 in.	Each	.25
2½ in.	Each	.28
3 in.	Each	.30

(Postage: 3c extra)

Dummy Motors—Celluloid
9-Cylinder

1½ in.	Each	$ .20
2 in.	Each	.30
3 in.	Each	.35

(Postage: 3c extra)

Alum. Disc Wheels
Rubber Tires; Brass Bushing

½ in.	Pair	$ .15
¾ in.	Pair	.15
⅞ in.	Pair	.18
1 in.	Pair	.25
1½ in.	Pair	.30
2 in.	Pair	.40

(Postage: 1c extra)

Liquid Celluloid

A new preparation; gives a marvelous, glossy, transparent finish over any surface; dries hard quickly; better than shellac, varnish or other "dope."

Bottle $ .10

(Postage: 2c extra)

Insignia Markings

Printed in colors on sheet 7x10 in. containing official insignia for 22 models, in various sizes.

Per Sheet $ .10

(Postage: 2c extra)

(Order from above lists; cash with order. No order less than 25 cents. On orders for less than $1.00, add postage on each item as above; $1.00 to $2.00, add 10% for postage on whole order; over $2.00, no postage, we prepay transportation.)

New Catalog 5c

Send for Your Copy Now!

1932 Edition, just published. Contains all Ideal Models and lists hundreds of Parts, Accessories and Materials you use every day, all at new and lower prices. It's the leading catalogue for Model Builders. Send 5 cents now and get one for yourself.

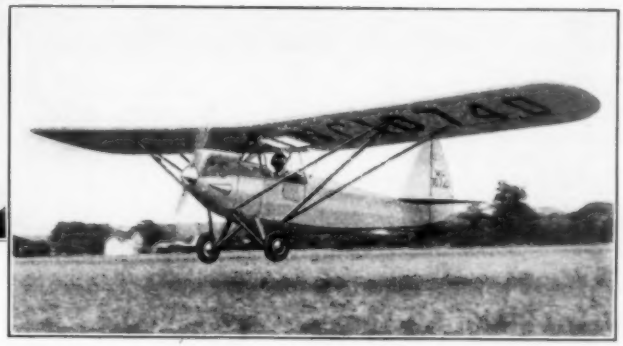
IDEAL AEROPLANE & SUPPLY CO.
Incorporated
22-26 West 19th Street
New York, N. Y.

Send Canadian Mail Orders to
CANADIAN MODEL AIRCRAFT
47 Hawarden Ave., Montreal.
(Canadian Prices are 40% higher to cover customs duty

Popular Aviation: Vol. 11, Number 1. Published monthly by Aeronautical Publications, Inc., at 608 S. Dearborn St., Chicago, U. S. A. Subscription $2.50 per year; single copies 25 cents; foreign postage $1.00 per year extra. Entry at the Post Office, Chicago, Illinois, as second-class matter, July 16, 1931, under the act of March 3, 1879.

XUM

EASY *to Own this Plane*



Anyone who wants the thrill of a plane of his own can now satisfy that desire. Heath pioneered low cost construction and operation in aviation. Now, Heath makes the most attractive offer in all their twenty-three years' experience:

A new Lower price
A new Simplified Assembly Kit
Deferred payment plan

With this new plan, costs are down to bed rock. Yet construction is easier. Parts can be shipped in groups. You pay only as they are ordered. Fuselage, tail, rudder, elevators and stabilizer come completely welded. Ribs are built complete at the factory. All you have to do to have a trim, fast ship of your own is assemble the ready built units. Anyone can do it—you can, easily.

Heath's should not be confused with ordinary "homemade" planes. When assembled with our simple instructions they are eligible for Department of Commerce License. They have won their events in the National Air Races the last six years. A Heath holds the world's altitude record for light planes, 17,907 feet. Heaths are truly "champion performers."

Fly This Summer!

We are making it easier than ever before to own a plane. You'll be pleasantly surprised when you get the details of our new plan. You can be flying in three or four weeks. The first group of parts comes for only $16.00. Complete plane (less motor) ready to assemble, $399. Only our large scale production methods make this astonishingly low price possible. For those who desire factory built ship, Model LN-B4, Flyaway, Niles, Michigan, $1,074. Write now for details.

------MAIL THIS COUPON!------

HEATH AIRCRAFT CORPORATION
Dept. R-27 NILES, MICH.

I am enclosing 15c for your booklet describing the new Heath, the new Assembly Kit and your new, easy purchase plan.

Name.....

Address.....

City.....*State*.....

HEATH AIRCRAFT CORP.

DEPT. R-27, NILES, MICH.

An Airy Chat With the Editor

FROM time to time, various aviation fans come into our office with all sorts of projects for the improvement of airplanes or aviation in general. Many are good, others just fair and still others see no immediate prospect of adoption by anyone.

During the past few months, the number of callers has materially increased, particularly the inventive delegates. This rather indicates that the depression will ultimately work out for the good of aviation, for it gives the promotive idea time for speculation.

* * *

ONE thing is certain. If some of these birds can devise some simple, effective means of suppressing the dust clouds at the airports, whenever the ships take off, he will sure be a public benefactor.

* * *

HOW many of you fellows believe that the 400 m.p.h. mark will be reached this year in any of the contests? Maybe some-one will creep out of the bushes and give us a real surprise with some sort of a super-engine hitched up to a streamline covering—maybe, it will be one of the numerous steam rigs—who knows.

* * *

SENATOR BINGHAM has come to the rescue of our air forces and of aviation in general. We only hope that Bill 4241 is accepted and eventually becomes a legal measure without being mangled and distorted in the process—a fate that has fallen to a number of other excellent measures.

* * *

AERIAL navigation, or "avigation" as it is now known, has become a real science. Further, excellent instruments have been devised within the last year that are as modern and effective as the new science.

It is for this reason that POPULAR AVIATION intends taking up this matter of avigation more extensively than in the past—for our readers' benefit.

* * *

CANARDS, or tail-first machines, are still intriguing the aeronautical world, yet not to the extent that any great number of them are being built. We have an article on this subject in this issue by a noted European expert who gives the Canard principle the Double-O, and tells us all about it from the European point of view.

* * *

AND now, friends of the invisible aviation audience, I have another thing to take up before I forget it. And that is, who made the biggest advance in aviation science so far in 1932? Well, I am rather of the opinion that there have been mighty few noteworthy improvements in airplane design so far, and that there is no immediate promise of much to come. It is still just a matter of serving up the same old dishes on the same old menu. Perhaps the ships are prettier this year. Mebbe they make a few more m.p.h. by loading on twice as much power as in 1931, but still it's the same old story in the same old way.

* * *

I'LL admit that we have the same old percentage of freaks with us this year as in every year 'way back in history. Backwoods inventors are still cementing feathers on the wings to make them lighter, and they are still turning out tin balloons filled with—a vacuum. This has been going on so long that it lacks novelty.

But it means nothing in the long run. What we are looking for—and apparently in vain—is some quirk that will cut the first cost, operating expense and maintenance down to a point where poor old John Smith can afford a ship. Where is the Henry Ford of aeronautics?

* * *

WE have been in receipt of a lot of kicks concerning the abbreviated "Airy Chats" in the last two issues. This is a real compliment, friend readers.

* * *

FROM time to time, we have had many requests from our readers as to the influence of engine compression pressure on the horsepower and similar inquiries in respect to the factors governing engine performance. And just to satisfy this demand for engine dope, the editorial staff have been digging away until they have finally compiled a whole lot of dope on the subject that has never been printed before. And, weather permitting, we will dish up this subject in our next issue. Most important of all, the data is compiled from the specifications of engines bearing the A. T. C. which will be more valuable than simple theoretical stuff.

* * *

AND here's where we pull a request for more dope to fill "What Our Readers Are Building." What's the matter with you fellows, anyhow? Have you stopped building lightplanes and gliders or are you too modest to send in the pix? We're running short. Help! Help!

* * *

WE STARTED out with the Round Robin Club with high hope that all of the members would cooperate and keep the letters going on their rounds, but as is so often the case, one or two members in each club persistently and consistently keep the seventeen clubs tied up.

As you can readily see, it takes a great deal of time and labor to watch over seventeen clubs—far more time than we have at our disposal in this office—and to answer all of the complaints that come in when a club lands up on the rocks. It is for this reason, and no other, that circumstances have made it necessary for us to so revise the rules and regulations that this office will be left out of membership.

And we will work it this way. When we get enough names to complete a club, we will write to the members and put them into touch with each other. After this, the matter is in your own hands to keep the club moving—sink or swim. Maybe this new sense of responsibility will help to keep things moving—we hope so—but it is practically impossible to keep things moving from this office when one or two members drop out or neglect their club.

* * *

AND what a row these new license laws have kicked up in lightplane circles! We have been deluged with letters on this subject since January 1, when these new laws went into effect. As you know, we are heart and soul with the lightplane and glider fans, and will do anything that we can to smooth out matters.

So, from now on, send in your troubles to POPULAR AVIATION, and if we get enough support, we will sure try to crack this nut. If this means putting a new "howl department" into POPULAR AVIATION we will do it. We

(Continued on page 61)

XUM

POPULAR AVIATION

A Magazine for the Promotion of Amateur Aviation and Private Flying

Volume XI JULY, 1932 Number 1

TABLE OF CONTENTS

FEATURE ARTICLES

Airy Chat with the Editor 6
Battle Tactics of German Fighters 8
My Five Years as a Parachute Jumper 11
Gen. Foulois Learned to Fly by Correspondence 13
Congress Considers "P. A." Plan for Free Civilian Training 16
European Experts Discuss the Tail-First Plane 19
Are Present Laws Fair to the Pilot 21
A Giant Flying Boat for the U. S. Navy 22
How to Break Into the Flying Game 23
Taking Care of the Lightplane Engine 25
Flying Steadily Since 1924 26
Our Trip from Berlin to London 27
Details of the American Cirrus Engine 29
Airline Hostesses Like Their Job 30
Latest Rocket Planes for the Stratosphere 31
Question and Answer Department 33
Conveniences of Modern Air Travel 35
The Life of Eddie Rickenbacker 37
Answers to Official Mechanic's Exam Questions 39
What Our Readers Are Building 41
New Enlarged Model Department 44

THE PICK OF THE BRIEFS

The Fastest Commercial Production in America 10
A New French Bomber of 2400 H. P. 10
New Lockheed Plane for Antarctic Exploration 14
A New Glider to Attack Record 14
All-Metal Mono-Wheel Airplane Arrives 15
A Combined Autogiro and Helicopter 15
And Here We Have Dug Up the Akron's Ancestor 22
What is the Future of Aviation? 24
Women Who Work on the Akron 25
A Reader Disagrees with P. A.'s Stand 26
Fuel Injection System for the Hornet Engine 30
A New Altimeter 30
The Photo Fans' Club 33
The New R-5 Kinner Engine 34
Cleaning Helium Gas for the Akron 36
The Day for Daredevil Pilots is Over 36
Reader Designs Ideal Flivver Plane 38
A Pioneer in Aviation 40
Testing Navy Aircraft for Airworthiness 40
Lightplane Alignment and Adjustment 43

POPULAR AVIATION. Volume 11, Number 1. Published monthly by Aeronautical Publications, Inc., at 608 SouthDearborn Street, Chicago, U. S. A. William B. Ziff, Publisher, B. G. Davis, Editor. John B. Rathbun, Managing Editor. New York Office, 551 Fifth Avenue, New York City. Subscription $2.50 per year, single copies, 25 cents, foreign postage, $1.00 per year extra. Contributors are especially advised to retain copy of their contributions, which must be accompanied by return postage. All such material will be handled with reasonable care, but this magazine assumes no responsibility for their safety. Any copy accepted is subject to revision or changes to meet the requirements of this publication. Payment for copy used will be made at our current rates. Entered as second-class matter, June 16, 1931, at the Post Office Chicago, Ill., under the act of March 3, 1879.

BATTLE TACTICS *of*

A slow German two-seater used as a decoy for Allied airmen. Concealed in clouds above are a swarm of German attack planes, ready to pounce upon their unwary foe.

by

CARL B. OGILVIE

Noted authority on World War aerial tactics and wartime personnel.

IN what is to follow, I will explain the fighting methods and tactics of the three greatest aces of the German Imperial Air Service—Captain Oswald Boelcke, Rittmeister Baron Manfred von Richthofen and Lieutenant Ernst Udet—The Trio of Death.

Captain Boelcke was the father of *jagdstaffel* tactics. The Flying Circus was his original idea. He developed the then original "smoke stack", "ladder" and "layer" formations of flying. He believed in overwhelming numbers rather than individual grandstand fighting.

This undersized Saxon was precision itself, ploddingly methodical. He flew with an uncanny yet natural flying instinct. He dropped planes in mighty squadrons—victories by the score. Mass formation. Mass destruction. Mass glory. He worshipped at the altar of overawing accomplishment. Precision was his watchword. He was a stickler for precision of attack. He must have had the right dope. He was never shot down. His death is the only one on record where a pilot of a squadron was the cause of another squadron member's death.

Accident—collision in mid-air—sent Boelcke to his doom.

He was a spectacular and daring pilot. More daring than Richthofen and unquestionably more scientific. More methodical, decidedly more precise. He flew his plane the way he taught his pilots to fly. He attacked with a determined method that became well known at the front. He seldom varied his tactics. Yet none could break through his defense nor out-maneuver him. He was the most valuable pilot the G. A. F. had in the air.

ALONE, Boelcke preferred to fly high and wait for lone Allied pilots. Unlike Richthofen, who had a special weakness for slow flying two-seaters, Boelcke would take anything that happened along below him. He depended entirely upon flying skill to win victories, to prevent himself from being killed.

He experienced an exceptional amount of gun jamming with his Spandaus. Often when in a dive to finish an enemy off, he discovered at the critical moment that his guns had jammed. Then, instead of winning a victory, he had to fight for his life with no means of defense excepting his remarkable flying ability. He never failed to extricate himself from Death Corner in the sky, although his plane was frequently torn to ribbons.

He most certainly was a remarkable tactician. Boelcke was the only German aviator that Richthofen ever looked up to as his superior. Superior in flying and tactics, but not in fighting instinct and the lust to kill.

The tactics of Baron Manfred von Richthofen, both legitimately aeronautic and the ingenuous traps he set, are too well known to repeat. But as a comparison of Germany's greatest ace with Rene Fonck we find interesting variance.

Like Fonck, *Herr Rittmeister* Manfred von Richthofen hung high in the clouds. He dove swiftly to the attack. But it was a one-dive attempt. If he failed, the mighty mankilling baron never returned for a second try.

But under what conditions did Richthofen go down for his victims? With one or two slow flying L. V. G.s or Rumpler observation planes used as decoys—sacrifice ships. When a lone Allied pilot's attention was riveted on downing a reconnaissance plane bearing the Maltese Cross, then the German was at his best. His surprise attack was certain to bowl the unsuspecting opponent into a newly dug grave.

With roaring full open motor Richthofen made his spectacular death dive But he was never alone. Always above, or to one side, hovered a strong formation of comrades to come to his assistance if he found himself taken by surprise.

IT WAS the baron who expanded Boelcke's massed squadron attacks. Thirty to forty—even fifty—in one gigantic formation. What chance did the average big Allied patrol of say seven to twelve planes have against the German horde? None.

What chance did Richthofen have of winning every victory? The odds were 100 to 1 in his favor. He knew it. He could well afford to be brave. Unquestionably he was a master aviator. A great fighter. He had the animal instinct of a born killer. And he killed and killed and killed.

The *Rittmeister* scoffed at his brother, Lothar, whom Manfred called "The Butcher." But Lothar killed the great British ace Captain Albert Ball and ended the war with half as many victories as his illustrious brother.

Lothar's success was due to, and he particularly owed his life to, the peculiar zigzag course he adopted and the

OUR World War fans and photograph collectors will be much interested in this announcement of another and different sort of war story.

In our next issue, Mr. Carl Bernard Ogilvie will present his highly entertaining and informative war story—"Medal Men."

In "Medal Men," Mr. Ogilvie gives us a most unusual slant on certain of our air-force personnel and upon the methods adopted in awarding honors to the fighters. This story shows the evidence of careful research in the war annals.

Some men were awarded high honors and became well known to the public. Others, who deserve fully as much praise remained in comparative obscurity. Why?

GERMAN FIGHTERS

The German Air Force produced a number of super-airmen whose tactics scored a tremendous list of victories. Among them were Udet, Richthofen and Boelcke, whose tactics are described here.

An Allied plane, a "Spad," shot down in an Allied sector by a squadron of German attack planes. The results of a fierce dog-fight by the Allied flyer against on overwhelming number of German planes.

sharp angular banks he used in escaping from pursuing Allied pilots.

A curious circumstance of publicity existed in the propaganda section of the German Headquarters. All the world had read in newspapers of the terrific killing ability of Richthofen. Yet at the front, on different sectors, he was utterly unknown.

A buddy of mine, flying for the R. F. C., said: "Richthofen, who is he? It's Udet we're after. He has wrought unbelievable havoc with our squadrons."

Richthofen got the publicity and glory. Little slender Udet, a mere boy, was regarded as the killer of killers by the Allies. He ran up a staggering list of 62 victories. And he is the only great ace of the Germans to come out of the war alive. Only a few months ago he was in America, taking part in our National Air Meet.

UDET is unquestionably one of the most capable pilots living. He was never wounded in battle, although he had many narrow escapes. This ace of aces, and Germany's greatest living fighter, who forced down Lieutenant W. B. Wannamaker of Aero Squadron 27, A. S., A. E. F., to break his spine in a crashed landing, was master of a daring technique.

Udet was a one-a-day fighter. He didn't win triple, or four and five victims a day like Fonck, Barker, Bishop and Putnam. Only once did he get two planes in one dog-fight. He won victories—one a day—but he won them day after day. When he discovered an Allied pilot diving on his tail, he executed an unusual and daring maneuver. Instead of putting his nose down and hi-tailing it, he zoomed, rolled and went climbing up to meet his foe.

This maneuver always took his adversaries by surprise, threw them out of position and put them at a disadvantage. Udet could depend upon his exceptional ability to handle any ship and particularly his tripe Fokker to put him into a favorable position for a fatal burst with his Spandaus.

Udet was on the wing that fateful day in April when the gods of Fate sealed the doom of his superior officer Manfred von Richthofen before the guns of the Canadian pilot Roy Brown.

Captain Roy Brown, C. O. of Squadron 209, was a good enough routine pilot to be given command, but he boasted no claims of greatness. The method of patroling he used for his pack of Camels was high altitude. The Canadian's duty was to protect low flying R. E.s of the Australian squadron

A typical line-up of German single-seater fighters at an enemy airdrome.

on photo missions. It was a thrilling and spectacular sight that 21st day of April when, following his usual tactics, he led his formation of seven Camels down in a terrific two mile dive to protect a lone R. E.

Brown usually brought his phalanx out of its dive at about 1,000 feet above the troublesome enemy planes. He would wiggle the wings of his Camel as a signal. The formation would then break in fan shape, circle and come down from all angles towards the pivotal spot near the R. E. Good strategy. Then every man for himself.

BUT on that particular April morning a group of red Fokker triplanes appeared. At the controls of one sat Baron von Richthofen. Then a flock of Albatrosses joined the fight. Altogether there were 22 Hun planes and only 7 Camels.

Dog-fights no end. It was Brown's strategy against Richthofen's killing methods. The Canadian saved the R. E., giving it an opportunity to escape. During the fight all the planes had lost considerable altitude. They were near the ground over No Man's Land.

Brown saw one of his novice pilots being riddled by a red "tripe." It was the kid's first time over. He had never had a shot at an enemy plane.

Brown did a quick cross and banking dive. He came down on Richthofen's tail. His Vickers sought the German pilot. He worked his stick, redressed his ship and took careful aim. His tracers hit the tripe near the tail. He nosed his Camel slightly upward. Lead poured into the cockpit.

It was all over for the mighty German ace.

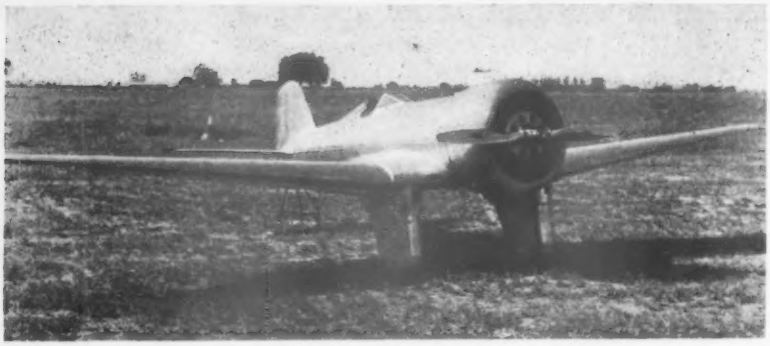
He went down as he had sent a hundred others. On their tail while they were concentrated on getting an easy victim.

Roy Brown's quick wit, splendid manipulation of his plane and good gunnery had spelled Richthofen's doom.

It wasn't how much an ace knew about maneuvers, what tactics he used, or how many victories he had won. It was how he fought that turned a duel in the sky into victory or defeat.

END

The Fastest Commercial Production in America



The sleek smooth lines of the all-metal monoplane developed by Stearman and called the "Beta."

FOR some time we have come to associate the names of Lockheed and Fleetster with speed in the air. Last year the Gee Bee was drawing attention by its spectacular assaults at records. Now, however, comes the Stearman "Beta", which it is claimed, is the fastest standardized commercial airplane in the world.

The Beta is an all-metal low-wing airplane and is streamlined to within an inch of its life. Look at the photograph—its lines are sleek and trim.

This particular model is powered with a Wasp Junior, 300 h.p. engine, and is built for cross-country flying, with room for the pilot only. With 60 gallons of gas, its cruising range is three and a half hours. But the ship cruises at 175 m.p.h. at 1,800 r.p.m., so you can figure on a nice long trip between refuelings.

It performs very nicely for a fast ship, with a top speed of 204 m.p.h. and landing at 66 m.p.h. The wing area totals 137 sq. ft., and the plane weighs 2,100 lbs. gross, a wing loading of about 15 lbs. per sq. ft.

Notice the telescopic pants on the wheels—the latest in design. When the plane lands, the pants telescope with the travel of the wheel on the oleo strut. The entire plane is covered with Alclad metal—a unique job of skin stressing—and each wing has a revolutionary "monospar" construction.

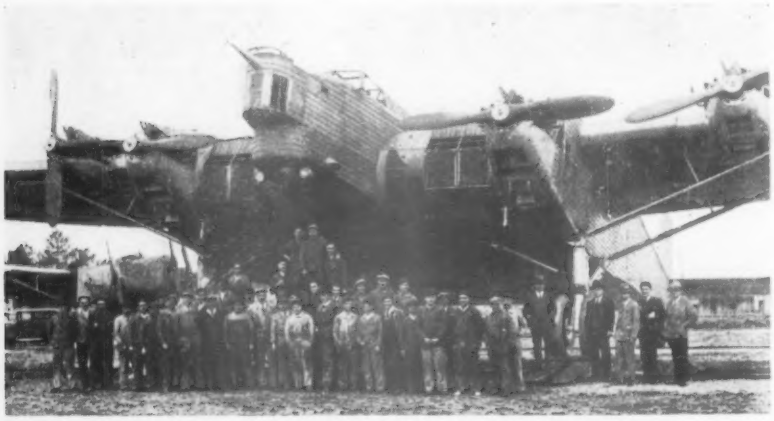
Another model is powered with the Menasco "Buccaneer" 160 h.p. engine, carries two people at 175 m.p.h., lands at 52, and weighs 1,740 lbs. gross.

A New French Bomber of 2400 H. P.

THE French aeronautical industry has produced a new bombing plane, the A. B. 20 B. N. 5, powered with four 600 h.p. water-cooled Lorraine engines and built by the Société Aériennne Bordelaise.

This large monoplane is a "flying wing" type with a 120-foot span. It is endowed with a central turret having a place for the navigator and pilot.

With 5,000 pounds of bombs, or a total load of 27,000 lbs., the A. B. 20 B. N. 5 has a cruising speed of 195 Kms/H (150 m.p.h.) and maximum speed of 165 m.p.h. It climbs at 19,200 feet and has a 750 miles action range with 4,000 lbs. of bombs. It ascends 13,500 feet in 35 minutes.



The tremendous size of this new French bomber can be estimated by comparing it with the throng of mechanics grouped in front of it. Note the double fuselage and deep windowed links between the fuselage and the central nacelle.

Develops New Gas Helmet

REQUEST was made of the Material Division, Wright Field, Dayton, Ohio, some time ago for the design and procurement of a helmet to be worn by persons entering the gas compartments of airships for the purpose of making inspection or repairs. Work of this kind has been found necessary in connection with the ZMC-2 airship at Scott Field.

Inquiry divulged the fact that, although nothing of this kind had ever been used in other government services, a crude helmet had been developed and used by the Metalclad Airship Corporation.

This helmet, made of two-ply balloon fabric, fits over the head somewhat after the fashion of a deep sea diver's helmet, except that it is fastened tightly about the wearer's neck on a collar of adhesive tape. A window of pyralin, approximately 6x4 inches, is curved to fit the forehead and is held in place by adjustable web straps inside the helmet.

Padding between the window and forehead insures comfort and holds the window at a proper distance from the face. This is the only part of the helmet fastened to the head, the space inside the helmet acting as an air reservoir. The air supply and exhaust lines are located near the wearer's mouth.

The two hose are taped together at intervals and fastened to a harness worn by the person entering the ballonet. An extra air cylinder for safety is hung on the back. A rip panel in the helmet makes it possible in emergency to get air to the wearer more quickly than by removing the helmet. The gas helmet is, however, safe and efficient and there is virtually no limit to the time which the wearer may spend in the gaseous chamber without ill effects.

Wing Covering Assumes Stress

HAILED as probable solutions of the problems attending the use of metal-covered wings on airplanes, two monoplane liners thus equipped by the West Australian Airways are rated the fastest commercial craft in that part of the world. The ships fly regularly between Perth and Adelaide.

Aviation engineers who long have experimented with metal skins usually agree that wings thus fortified assume the stress, a large part of it which is usually carried by other parts of the wing structure when it is covered with fabric. But there remains a disadvantage in the use of metal which, until it is removed, will bar wide application—the difficulty of inspection of the wing from the interior, an extremely important phase of maintenance. A wing covered with fabric is more easily stripped for examination or repair.

XUM

My Five Years as a Parachute Jumper

by WILLIAM L. HOPSON

Inside practical information on parachute jumping by a professional "silk-worm."

"THERE he is out on the wing!" How many times have you heard that cry as you stood at some airport gazing upward to where, two or three thousand feet above, an airplane with throttled motor glided almost noiselessly overhead.

By straining your eyes, you probably managed to catch sight of a tiny dot standing on the wing alongside the fuselage which, as you watch it, suddenly tumbles off, falling end over end through space.

For a distance of perhaps five hundred feet you watch it fall, then there is a flash of white, a muffled THRUMP, and a moment later the tiny figure is swaying pendant-like safely beneath a huge umbrella of silk. Then you hear some person exclaim: "That guy has got more nerve and less sense than I have." And another says: "I wonder just how he feels falling through the air like that."

During the five years that I put in as a professional parachute jumper I have been asked not less than one thousand times such questions as, "How did you feel when you made your first jump? Were you scared very much? Do you ever have a feeling in your stomach like people get when they go down in elevators? Can you breathe while you're falling? Do you ever lose consciousness?"—and a multitude of others.

Since I did not start jumping parachutes until 1927, I make no claim of being what is termed an "old-timer" in the game, but even as late as that time nearly seventy-five per cent of the exhibition jumpers still used the old type parachute. In actual shape it differed but little from some of the modern pack 'chutes in use today.

The only difference was that the shroud-lines were fastened to a wooden wheel—usually off some old car—instead of being divided into four groups and fastened to the risers above the shoulders as they are on modern pack chutes. However, when it came to packing and jumping them, it was an altogether different proposition.

The container for the parachute was a bulky canvas bag enclosed in a network of six, and sometimes eight, ropes. One end of each of these ropes was plaited to the others and fastened on the bottom of the bag. The other end, which ended at the mouth of the bag, was tied into a small steel ring.

The parachute was folded into the bag with accordion folds, on top of which the shroud lines were laid back and forth with a piece of newspaper in between each fold to keep them from becoming entangled. The wheel was now pressed into the mouth of the bag and a rope run through the circle of rings. Then the mouth was drawn closed and the rope tied in a bow-knot.

Through a small opening, between two of the rings, hung the rope sling or trapeze which was fastened to the wheel. Sometimes, the jumper wore a regular web harness with snaps on the shoulders which snapped into large steel rings attached to the wheel.

The bag was tied, mouth down, beneath the balloon

And then comes the landing, which in this case was directed at a target shown at the right

with the jumper's weight resting on the ropes around the bag and with the bow-knot that held the mouth closed. When he pulled the knot, his weight jerked the chute from the bag.

THE same arrangement was used to jump from planes, except that the bag was tied on the walk alongside of the fuselage. When the jumper was ready to leave the ship he merely snapped the snaps into the rings, jerked the knot to release the chute and stepped off.

My first jump was made from an old smoke balloon. The regular jumper

Diving head-first off the wings of the plane before pulling the rip-cord is probably the safest method.

suffered the misfortune of landing on an exhibit building at a fair, breaking his arm, and I persuaded the owner of the balloon to let me make a jump. He claimed the world's record for the number of jumps, having made better than 2300 since 1909. Frank Brooks of Portland, Oregon, also claims this record with about the same number but he had long since stopped jumping for his feet had been broken so many times that they were nothing more than deformed clubs.

"Hang on tight," he instructed me that afternoon, when I put my leg through the rope sling used for harness, "and watch the ground. When you see me wave a white cloth, reach up above your head and pull that bow-knot." I nodded, gripped the ropes and he cut her loose.

The balloon shot upward and my stomach felt as if it had dropped a couple of feet. As soon as I got used to rapid ascents the hot and cold sensations that had been running all over me, began to cease. But I wasn't reassured by any means. I was pretty certain that the 'chute would open all right, but how I did dread that first one hundred foot drop.

When I had reached an altitude of perhaps two thousand feet, I looked down to see a tiny white speck fluttering among the ant-like spectators far below. So I took a good breath, closed

my eyes, hoped for the best and gave the bow-knot a yank. For about the next ten seconds I felt as if my stomach had jumped clear up into my chest, then I opened my eyes to see spread out above me the red white and blue panels of the chute.

As soon as my weight left the balloon, the small sandbag tied to the top of the balloon with a long rope, turned it upside down, letting the smoke out of the hole in the bottom. A few moments later it dropped past me on its way down.

After the chute had opened, I began to enjoy myself, thinking the worst was over. Like the general public, I didn't know that the worst part of any parachute jump is in the landing. Directly below me were the outspreading branches of a large tree growing inside the grounds of an insane asylum, and because I knew nothing as yet about "slipping" a chute, I made a bulls-eye directly in the top of it.

A double jump of the "drag-off" type, the two men pulling the ring and dragging off the wings at the same instant.

I went crashing down through its branches until my foot caught in one of the crotches where I stopped, hanging almost head down. Grasping a limb I lowered myself to the ground, nursing a skinned ankle.

MY first attempt to jump from an airplane almost ended in disaster. The day following the jump from the balloon, I bought an old 'chute for twenty dollars from the balloon man and headed for a small town in Idaho where he had told me that a fellow who owned a plane was looking for a parachute jumper.

I considered myself a veteran by then. I found the owner of the plane and his pilot hopping passengers at a little country fair, and because the man they had depended on to make a jump had not put in appearance, they were pretty glad to see me.

As soon as I saw the ship, I knew that I was going to have trouble getting clear of it. It was a special built job, a Jenny fuselage with an enlarged cockpit up front. It was powered by a 140 horsepower Curtiss K6 motor, fitted with a DH landing gear and having U. S. A. 27 high lift wings.

Instead of the usual step on the wing, a steel ladder had been constructed which ran from near the ground at the pilot's cockpit, up alongside of the fuselage to the passenger's cockpit in front.

My old 'chute was only fitted with a rope sling which forced me to hang the bulky container on my stomach. Not having any experience, I didn't feel equal to the task of walking backwards down the ladder and jumping off.

I finally hit upon the idea of tying the bag to the spreader bar of the landing gear and jumping from there. All I would have to do then would be to hang by my hands, pull the knot and let go. It would have been a swell idea if everything had worked all right.

THE pilot was an ex-army flyer and a good one, too. His name was Manley Richey. (He crashed to his death at Jerome, Idaho, on September 21st, 1930.) With his help, I packed the old 'chute as near as I could remember, and when we were ready to go, he told me that when he cut the gun at two thousand feet it would be the signal for me to slide off.

I then tied the bag to the spreader bar and crawled in on top of it.

The mechanic swung the prop, and a few moments later, Richey gave the old K6 the gun. I'll never forget how that old rickety landing gear creaked and groaned as we bumped off across the field, and when Richey finally did coax her into the air, I gave a sigh of relief.

Things went fine for a little while, but when we had climbed to 800 feet the old K6 got hot and conked out. Because I had never been up but twice before, I thought we had reached two thousand feet so I slid off and hung by my hands and began to work at the knot. And, for the only time of the thirty-three jumps that I made with the old type parachutes, the bow-knot slipped through into a hard one and wouldn't come loose.

Hanging by one hand, and then the other, I worked at it until I figured we had lost about a thousand feet. Then I looked down to discover that we were gliding in over a fence about one hundred feet above the ground. Right then and there came the realization that I was in serious trouble and plenty of it.

I did a good imitation of a monkey trying to scramble back upon the spreader bar, but the bag hanging on my stomach would only allow me to climb up far enough to get my elbows hooked over it and there I hung—waiting for developments. They wern't long in arriving! The back of my heels hit the ground, then then seat of my pants, my back and lastly the two wheels!

RICHEY had picked a large wheat field, from which the grain had just been cut, to set her down in and it was covered with wheat stubble about eight inches high. By the time the old Jenny stopped rolling—which wasn't very long—the back of my shirt had been ripped to shreds and my whipcords had collected a pile of dirt.

(*Continued on page* 56)

Well! Here's Louis Bleriot

Louis Bleriot, the central figure in the group, is one of our earliest birds.

LOUIS BLERIOT, the French aviation expert and constructor, is one of aviation's very earliest pioneers. He is particularly distinguished as being one of the first and most ardent advocates of the monoplane idea.

His early model, the "Bleriot XI", was the first plane to cross the English Channel and, in its day, the XI performed many other notable feats and established many records. From what we see in the picture, Bleriot's hair is not any thicker than it was back in the pre-war days.

Bleriot has long been a leader in aviation and in aeronautical engineering. His deft touch has been seen in the majority of the French productions, both before and after the war.

This Will Be Common Sight a Few Years From Now

WITHIN the next few years a picture such as this will be quite common. Airplanes for sale on the same lots as used cars. Why not? It is no worse to get a new plane than to get a new car. The old car has a value, so has the plane, why not sell it?

As the picture shows, second hand airplanes are for sale on the "lot" the same way as autos. Of course, such a scene as this is not common, but just wait a few years.

Here the cabin ship is lined up for sale with the used cars, on the sales lot.

Gen. Foulois Learned to Fly by Correspondence

by CARL B. OGILVIE

Persistency and tenacity conquer all difficulties, even to the flying of an old time Model "A" Wright biplane without personal instructions. The pilot of a one-man air corps got his start with a pencil and paper.

THE new chief of the U. S. Army Air Corps is the foremost military aviator of our United States and one of the outstanding pioneer military airmen of the world. He was the first army officer to fly an airplane in this country

That distinguished man is Major General Benjamin D. Foulois. In truth he is the Father of American Military Aviation. It is both fitting and proper that the first ranking officer, in point of military aviation service, should also be the first ranking officer of the Air Corps.

I was more than mildly astonished when I heard that the first ranking officer of the Air Service had learned to fly by mail. It seemed to me to be a tall story—and a mighty tall one. Skeptical, I set out to get the data of the early aviation training of the man who is now training hundreds of pilots for every branch of our Army Air Corps.

In a volunteer company, during the Spanish-American War, there was a lad of eighteen who not only displayed great courage and a true fighting heart, but who also possessed the ability to lead men. That buck private was Benjamin Foulois, who soon became corporal and then a sergeant. The war with Spain ended and the sergeant enlisted in the Regular Army. And for bravery and efficiency during the Philippine insurrection, he was commissioned a second lieutenant. When the United States sent its Army of Pacification to Cuba he was there as an officer of the Signal Corps.

AS the Signal Corps first mothered balloons, dirigibles and airships, it was quite natural that the general, then a first lieutenant, should have an opportunity to study them and dream of their future value to the military service.

Now in 1909 he was to watch Orville Wright fly a curious biplane mounted on skids or monorails. It was the first military plane built for our government. The then first lieutenant of the Signal Corps sat on a narrow seat beside Mr. Wright, acting as his observer. The plane broke three world's records on that remarkable flight—speed, cross-country flying and altitude.

General Foulois (then lieutenant) seated in a pre-war tractor plane. It is interesting to note the shoulder yoke and pads then used for the aileron controls before the advent of the present "stick" control.

It developed a surprising speed—averaging forty-two miles per hour—and flew at the great height of 600 feet for the long distance of ten miles!

This ship was purchased by the government and the lieutenant was detailed as its pilot. His ground crew consisted of a squad of eight enlisted men. Then this man, who was to become our first military aviator and later the youngest brigadier general in the American Army during the World War, set himself to the task of learning to fly. And he learned to fly by mail!

TODAY the Air Corps of the U. S. Army has as its Chief, a quiet and modest but albeit a highly efficient executive. A man whose flying experience has constantly been associated with the pioneering of military aviation in the United States. That singularly capable man is Major General Benjamin D. Foulois.

To write the history of military aviation in America is to write of that man's colorful career. To write of Major General Foulois is to write the history of military aviation from its earliest pioneering days to the present time.

Recently, a new fact concerning the Chief of Staff's early flying training came to light. Mr. Carl Bernard Ogilvie, authority on military aeronautics and contributor to this magazine, made a trip to Washington, D. C., especially to get the story appearing in this issue.

Gen. Foulois was undoubtedly the first correspondence student of the first home-study course in aeronautics—which is a distinction alone. And when finished with the course was the first military officer to win an F. A. I. license.

It may seem rather amusing, but it was mighty serious work for the lieutenant. Congress had absolutely no confidence in airplanes as instruments of war, nor for any purpose for that matter. Its niggardly appropriation of $150 for the "Air Corps" displays that. It was necessary for General Foulois, during that first year, to pay three hundred dollars out of his own pocket for maintaining the "Air Corps".

But he had faith in the future of aviation and unquestionably had faith in himself. And because of his faith and determination, he made tireless and innumerable tests and experiments. He had to experiment to develop military flying, made safety belts, tried wireless communication from planes with armies in the field, and developed formation flying, reconnaissance and artillery regulation.

Back in 1909, he had taken his seat on the leading edge of the lower wing and steered the pusher biplane across the ground and up into the air. Gradually getting the feel of the craft and gaining confidence each time, he would experiment with different elementary maneuvers.

(*Continued on page* 66)

A New Lockheed Plane for Antarctic Exploration

Here is the new Lockheed Antarctic monoplane, a decided departure in design from their conventional practice, but still a Lockheed just the same.

A NEW Lockheed monoplane has recently been built for geologic exploration in the Antarctic regions. Bernt Balchen, formerly associated with Admiral Byrd as pilot, will be the pilot of the new ship.

It will be seen from the accompanying photograph that the lines of the new ship are somewhat different from the conventional Lockheed practice. The fuselage cross-section differs from the usual circular section and the appearance takes on the general features of the Fokker monoplane, although the constructional details are considerably different.

One Air Accident Every 418,386 Miles

IN 27,195,062 miles of flying by scheduled air transport aircraft during the last six months of 1931, there were 65 accidents, of which 9 involved fatalities, according to an announcement made by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. The airline craft flew 418,386 miles for each accident and 3,021,674 miles for each fatal accident during this period.

In a study of the injuries and fatalities occurring on scheduled airline accidents during the last half of 1931, it was found that 37 persons suffered minor injuries, 5 were injured severely and 24 lost their lives. The latter included 17 passengers, 6 pilots and 1 copilot who died in aircraft accidents or as a result of injuries received in aircraft accidents. In all, there were 206 persons involved in scheduled air transport accidents, of whom 140 escaped with no injuries whatever.

A New Glider to Attack Record

HERE we have the main structural members of the new glider, built by William H. Bowlus. In this glider, Bowlus intends to attempt a flight from San Francisco to Glendale, Calif., which, if successful, will break the World's record of 202 miles, now held by Robert Kronfeldt of Germany.

It is interesting to note the great length, lightness and apparent strength of the main wing spar by which the full weight is suspended without further bracing or reinforcements. Judging from the attitude of the young men holding the framework, the main members of the glider weigh very little.

The tremendous wing span of this soaring glider is apparent in this picture, and the stiffness of the spar is proven by the wide separation of its supports.

30 Cylinder Airplane Engine

ONE of the largest aircraft corporations in the United States is considering the building of a plane around a thirty cylinder engine, the design and a model of which has been submitted to them by a prominent engineering concern.

The thirty cylinders are in five banks of six cylinders each, arranged radially around the crankcase. It has the appearance of six five-cylinder radials placed one behind the other. However, due to the difficulties which would be encountered in cooling and streamlining an air-cooled engine of such a design, it will be water cooled.

Because of its radial form, and the water-cooled principle, the engine can be incorporated in a perfectly streamline fuselage, with only the radiator exposed. Parasite drag will be cut to a minimum.

The engine is expected to have a normal output of sixteen hundred horsepower. By various means this could be stepped up to considerably more.

Such an engine, if used with a carefully designed racing plane, would again place the United States in line as a leading contender for speed laurels, in competition with other countries. Its greatest value will lie in the field of commercial aviation, where it can be used to an advantage in powering larger and faster transports.

High Flying Is A Cure

FLYING at high altitudes has a marked tonic effect on nearly all pilots and passengers.

That is the conclusion reached by Dr. E. Goodwin Rawlinson, director of the British Royal Institute of Public Health, who has just completed a study of the airplane in relation to medicine, at London, England.

"Persons with a bothersome cold who want the condition cleared up on short notice could get up a little early, slip over to the doctor's and 'knock' the cold with a jaunt in the sky," declares Dr. Rawlinson. "In the more serious diseases, like tuberculosis or heart disease, patients would be prescribed a certain number of minutes at a certain altitude so many times a day.

"This altitude dosage, given by a pilot under a physician's personal instruction and in a plane owned and operated by the physician or hospital, would not be prohibitive in cost after it became an established part of medical practice."

The tonic effect has been found to be due to a sharp increase in the rate of metabolism, or energy obtained from oxygen and food. This is partly due to the air and partly to the effects of sunlight at heights where the atmosphere is pure, rarified and does not cut out many of the tonic rays of the sun.

New Type of Ace in Air Corps

THERE will shortly be a new kind of ace in the United States Air Corps, writes Carl Bernard Ogilvie, authority on Military aviation.

He states the new acedom will not come from shooting down enemy planes, or making long distance speed flights, or "bailing out" in a chute for the fifth time. The honorary title will be caused by jammed retractable landing gear.

Captain Ira Eaker ranks first on the list to become one of these new aces by making pancake landings when the folding landing gear of his plane refused to retract. The hero of the "Question Mark's" 150 hour endurance flight has displayed remarkable skill at sliding the belly of a fuselage along the ground to safe, if somewhat thrilling, landings. As if protected by an unseen hand of good fortune he has, in each instance, escaped serious injury.

In each of the four failures of the landing gear to retract the wheels back to landing position, Captain Eaker has been in grave danger. It is impossible for a pilot to see his wheels. He has no way of knowing, for a certainty, if the retracting mechanism has functioned properly or not. Coming in for a landing at a mile-a-minute speed, expecting to land on shock absorbing balloon tires, then suddenly crash the underside of a fuselage, has given more than one pilot a shock and put some in the hospital.

Captain Eaker's four landings are a record. One more and he will be an "Ace Toboggan" flier.

Plane Aids Men in Canyon

TWENTY-EIGHT men who were marooned at a dam-site in a canyon, narrowly escaped starvation.

After being a week without supplies, a pair of nervy aviators succeeded in dropping supplies from the height of one hundred feet above the camp.

It was a risky business, diving down a narrow twisted canyon and, while one of the pilots handled the plane in the dangerous position, the other man dropped the food to the men who had been without anything for a week.

With the supplies, a letter of instructions was dropped telling the men of the danger of high water and instructing them to climb and put their camp higher on the hills of the canyon.

Glider Schools in Russia

FOLLOWING a study of two years, the Friends of Aviation, a Russian society of flying fans, is going in for gliding in a big way. A glider factory to produce 1,500 sailplanes a year has been built in Moscow, and a chain of clubs is planned throughout the country.

Glider schools have been formed in Moscow, the Crimea and Siberia, and others are to be started. Any trade union member above the age of 16 may join the schools.

An All-Metal Mono-Wheel Airplane Arrives

This ship, besides having a single wheel landing gear, displays other novel points such as the wing type castors, wing stubs, flat struts and low gravity center.

CHARLES HALL, Farmingdale, L. I., has developed an airplane which possesses several unusual points of interest. In the first place, it is built entirely of metal. Secondly, it has only one main landing-gear wheel, instead of the two wheels usually provided.

When standing still, or rolling at very slow speed, very small "castor" wheels at the outer ends of the wing bracing, prevent the ship from turning over. When at high speed on the ground, all of the weight is taken by the single main wheel, directly beneath the fuselage.

The pilot is seated on the right-hand instead of the left-hand side of the fuselage, and the controls are suspended from the roof of the cabin instead of being fastened to the floor. It will be seen that this arrangement of the controls simplifies their connection to the ailerons and to the tail surfaces.

A Combined Autogiro and Helicopter

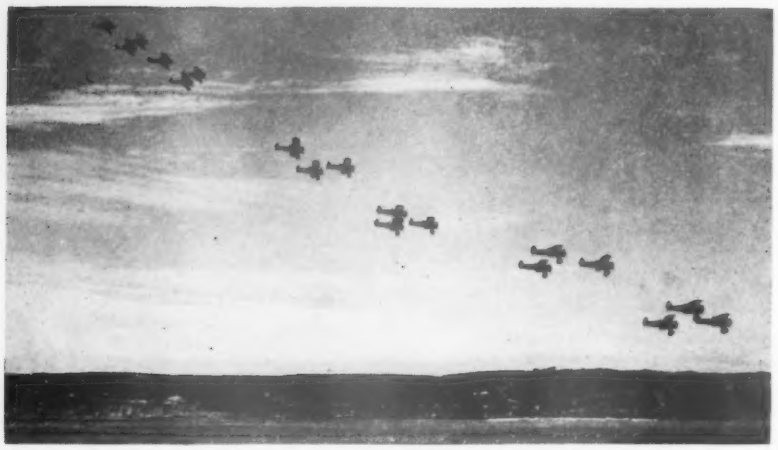
CHARLES UNGERMAN, JR., and George F. Miller, Los Angeles, Calif., have built a novel type of direct-lift machine which is to sell for less than $1,000 when it is put into production.

In it are embodied both the principles of the helicopter and autogiro, and it will be seen in the photograph that the usual short wings of the autogiro have been eliminated. This means that all of the lifting must be performed by the rotor, instead of being divided between the rotor and wings, as heretofore. It is entirely a wingless proposition.

Powered with only a 60 h.p. engine, the machine will ascend and descend along a nearly vertical line. It is claimed that the cost of upkeep is very low and that it provides a maximum of safety in flight.

A combination helicopter and autogiro without the stub wings used in the standard autogiros. A very neat looking job.

Congress Considers "P. A." Plan



If the P. A. plan is approved by Congress, the above view will be a common sight. One-hundred-thousand young men will be trained at government expense to provide an emergency air reserve force.

OUR Readers have helped tremendously in this undertaking. Up to the time of going to press with this issue, we have received a grand total of over 7,000 names on our petition list which will be placed at the disposal of Senator Bingham.

VICTORY seems near at hand for the Free Civilian Training plan sponsored by the publishers of POPULAR AVIATION.

Thousands of our readers and their friends, who supported this movement by their signed petitions and enthusiastic letters, will be pleased, we are sure, to hear of the progress being made in the interests of national defense and in the interests of the aviation industry at large.

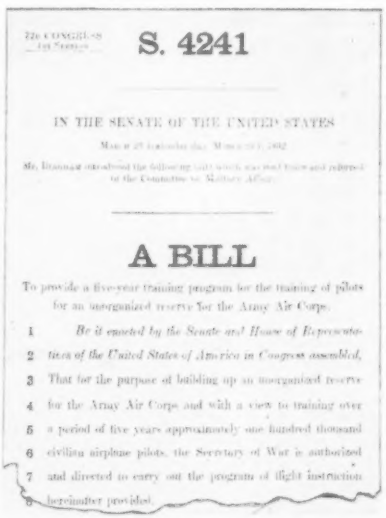
Our latest report deals with the introduction of the training plan to the United States Senate and the Committee on Military Affairs by no less a personage than Senator Hiram Bingham. Senator Bingham's bill, which covers all of the points raised in the recent article "Which" appearing in the March issue of POPULAR AVIATION, is known as the "Bingham Bill—S-4241"!

It is with considerable pride that we point to the achievement which is certain to have a profound influence upon the future of military aviation in the United States and the development of the various branches of the aeronautic industries, even during these times of industrial depression.

We have worked hard on this project and have spread the news far and wide, both through direct solicitation and through the efforts of our friends—the readers of POPULAR AVIATION. It would seem from information at hand at the present time that this bill cannot fail to gain the approval of the senate.

Senator Bingham presented the bill to the first session of the 72nd Congress, where it was read twice and then referred to the Committee on Military Affairs on March 23, 1932. This bill, in short, provides for a five-year training program for the training of pilots to form an unorganized reserve for the Army Air Corps. It has in view the establishment of a reserve for the Army Air Corps for which approximately one hundred thousand civilian airplane pilots will be trained during the five-year period. This should be good news for the one hundred thousand young men who are eligible for this training as well as good news for the patriots of this country at large.

ITS EFFECT upon the aviation industry will be immediate. First, the bill provides that, so far as possible, civilian pilots will be employed for training the students, thus at once giving employment to hundreds or even thousands of competent civilian pilots who are now unemployed. Second, it provides that the Secretary of War is authorized to contract with private training schools for the services of their pilots, thus bringing the days of prosperity back to schools which have been languishing during the depression.



72D CONGRESS
1ST SESSION

S. 4241

IN THE SENATE OF THE UNITED STATES

MARCH 23 (calendar day, MARCH 24), 1932

Mr. BINGHAM introduced the following bill which was read twice and referred to the Committee on Military Affairs

A BILL

To provide a five-year training program for the training of pilots for an unorganized reserve for the Army Air Corps.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That for the purpose of building up an unorganized reserve for the Army Air Corps and with a view to training over a period of five years approximately one hundred thousand civilian airplane pilots, the Secretary of War is authorized and directed to carry out the program of flight instruction hereinafter provided.

A photographic facsimile of the printed Bill presented to Congress by Senator Bingham. The Bill follows closely the plan outlined by POPULAR AVIATION.

Third, but not least, is the fact that the Secretary of War is authorized and directed to provide for the construction and procurement of such aircraft, spare parts, supplies and equipment as may be necessary to carry out the program. This means a tremendous demand for aircraft during the five-year program, the employment of many thousands of aircraft workers and the consumption of a tremendous amount of raw materials. And best of all, as an answer to the inquiries of uneasy taxpayers, the cost of the whole program will be almost insignificant when compared to the many unnecessary expenditures now being made and made in the past for our military establishment.

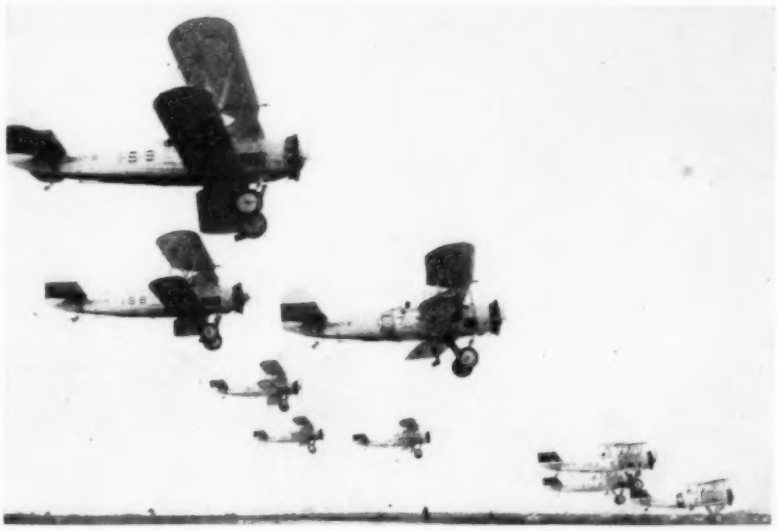
It is difficult to imagine any foreign power, no matter how greedy and envious of the United States, that would be foolish enough to attack a country having one hundred thousand trained pilots ready to enter actively into aerial military service or advanced training on a notice of twenty-four hours! It is the answer to our prayer for an adequate national air defense, and it should spell reassurance to those of our citizens who have feared and deplored past conditions in our air service.

This has long been the dream of the editors of POPULAR AVIATION, who have left no courses uninvestigated that would lead to the ultimate success of this program. It is our idea that the present plan, while not ideal, is far superior to the various subsidy schemes and civilian training plans initiated by the European governments. Its very simplicity speaks for its practicability. It is not obstructed by any clauses that demand an investment by the prospective students such as is the case with the French subsidy plans now in force. The material and instruction are provided free so that all classes of students may enter equally into the training.

Now see how different this plan is from the civilian training method in France. The French government is encouraging private flying and the development of a military reserve corps, by rebating fifty per cent of the cost of the plane to the student pilot. The

for Free Civilian Air Training

THE Bingham Bill presented to Congress by Senator Hiram Bingham is a patriotic attempt at making America first in the air. This Bill, if passed, insures the safety of our national defense and establishes the aviation industry on a firm foundation.



100,000 reserve flyers, trained to fly in military formation as shown above, will be the best guarantee in the world to keep America out of War.

student pays half and the government pays half on the expensive type of plane demanded by the government. And then—the French government reserves the right to requisition the plane in case of war! This demands an investment of from $1,500 to $2,500 by the student pilot, which of course, limits the field. And besides, the student loses his investment as soon as war is declared. However practical this plan might prove in Europe, it would never prove feasible in the United States.

And now we will read the Bill itself of which the following is a true copy.

72d CONGRESS S. 4241
1ST SESSION

IN THE SENATE OF THE UNITED STATES

MARCH 23 (calendar day, MARCH 29), 1932

MR. BINGHAM introduced the following bill, which was read twice and referred to the Committee on Military Affairs

A BILL

To provide a five-year training program for the training of pilots for an unorganized reserve for the Army Air Corps.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That for the purpose of building up an unorganized reserve for the Army Air Corps and with a view to training over a period of five years approximately one hundred thousand civilian airplane pilots, the Secretary of War is authorized and directed to carry out the program of flight instruction hereinafter provided.

SEC. 2. (a) The flight instruction authorized in this Act shall be carried on at municipal airports throughout the United States, the use of which may be tendered for that purpose to the Secretary of War free of cost to the United States. The Secretary of War is authorized to accept the use of any such airport upon such terms and conditions as he deems advisable.

(b) Such instruction shall be given, subject to the supervision of the Secretary of War, so far as practicable, by civilian pilots employed for that purpose by the Secretary of War, but pilots from the Army Air Corps and the Army Air Corps Reserve may be utilized, if any such are available. The Secretary of War is authorized to contract with private aviation training schools for the services of their pilots in carrying out the provisions of this Act.

(c) The Secretary of War is authorized and directed to provide for the construction and procurement of such aircraft, spare parts, supplies, and equipment as may be necessary to carry out the program herein authorized.

(d) The Secretary of War is authorized to employ and compensate, at a rate not to exceed 65 cents per hour, such airplane mechanics as may be necessary to maintain and equip the aircraft utilized in carrying out the five-year program herein authorized and in connection with the training of pilots to make effective the purposes of such program.

Senator Hiram Bingham of Connecticut, president of the National Aeronautic Association and a staunch booster for American aviation in general. He has a long and honorable record in his battles for the protection of aviation.

SEC. 3. (a) Persons to be trained in flight instruction in the manner provided by this Act shall be selected by the Secretary of War, after such examination as he may prescribe, such selections to be made with a view to limiting the trainees at any municipal airport to persons resident within the congressional district wherein such airport is located; but nothing in this Act shall be construed to prevent the Secretary of War from transferring such trainees from one airport to another or from making selections otherwise than as herein prescribed, if he deems such action necessary to carry out the program authorized by this Act.

(b) The course of training under this Act shall be prescribed by the Secretary of War, but shall be designed to give at least twenty hours' flight instruction to each person enrolled for the course.

(c) No compensation or per diem or other allowance shall be paid by the United States to any person while under instruction in accordance with the provisions of this Act.

SEC. 4. The Secretary of War is authorized to prescribe such rules and regulations as may be necessary to carry out the provisions of this Act.

SEC. 5. There is hereby authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act.

• • •

IN A very comprehensive letter written to POPULAR AVIATION by Benj-

amin F. Castle, of New York, N. Y., the writer says with truth:

****It is an expansion of our 5-Year Morrow Plan. It seems to me that this would give an unorganized reserve of air pilots immediately available in the event of war and thus put the Air Corps in a position so that the differential in the training period, as between officers of other arms and officers of the Air Corps, would not be from 3 to 6 months as it was during the World War.*

And another beneficial effect of the carrying out of this plan would be a stimulus to flying. It would certainly reduce the cost of airplanes and equipment, arouse a widespread interest in private flying and enable many of the private schools that are now staggering along for the want of students, to employ their instructor personnel and mechanics and automatically create for them prospects for the purchase of planes and for more advanced instruction. It would also be of benefit to the many flying fields throughout the United States which are now practically without aviation activity.

Calculation of the cost of carrying out this project indicate that it will be less than $18,000,000 for the entire five-year period, representing the cost of a pilot trained of approximately $180.00.

I would very much appreciate your opinion of the bill introduced by Senator Bingham. I understand that he also would welcome criticism and comments. In this connection, one suggestion has been made that the bill should be amended in reference to Line 10, Section 2-A, by striking out the word "municipal", and by adding the word "airport"—"not government owned".

This suggestion was made by William J. Hotz of 1530 City National Bank Building, Omaha, Nebraska. He gave as his reason for the suggestion, "There are a large number of fields throughout the country that are more adequately equipped for such work than certain municipal airports, and in some places, there are no municipal airports available, even though a large number of persons would be interested."

There seems to be considerable merit in Mr. Hotz's suggestion. It will by just such helpful suggestions as this that an ideal bill can be finally worked out. I have no doubt that the publication of this bill in your excellent magazine, and editorial comment by you, will evoke wide discussion which should be exceedingly helpful.

And we are in entire agreement with Mr. Castle and Mr. Hotz in this matter. Government fields and municipal fields should be left entirely out of the bill, and must be, if aviation is to benefit from this bill as a whole. For the sake of progress and efficiency, let us keep this training plan out of politics and political influence, both of which have ruined many and many an excellent project in its infancy.

END

Old-Time Movie Thriller

This "changeover" stunt is not a new one but it is always a hair-raising thriller for the visitors.

SOME years ago it was quite a thrilling sight to see the movie hero change from a speeding auto to a plane, in the rescue of the blond beauty.

Today this sort of excitement is rather tame. It was just the other day that a twelve year old girl made such a change, and not even the local papers made any comment.

At an exhibition of flying in Germany recently, a man transfered from an auto to a plane as a part of one event. The change was something of a thriller, for he almost missed.

Exterminating Coyotes by Plane

A SPORT which is profitable as well as highly entertaining has been devised by two young men of Chadron, Nebraska. In one month last winter they bagged fifty coyotes by using an airplane and sold the pelts for $350. A. H. Watson owns a light plane and accompanied by Dallas H. Skiles he flies over the broad flats and sandhill dunes of western Nebraska, southwestern South Dakota and eastern Wyoming, searching for the animals.

The fliers find they are welcomed by the ranchers, due to the fact that the coyotes take heavy toll of the chickens, lambs, new-born calves and young pigs belonging to the ranchers of the territory. Skiles, who rides in the front cockpit with an automatic shotgun by his side, signals Pilot Watson when he sights a coyote. The pilot levels the plane off within seventy-five to one hundred feet of the ground. Skiles unloads a charge of buckshot at the fleeing animal.

At times they have to land the plane in some unlikely looking spots in order to retrieve their kills. Thanks to the slow landing speed of the ship, they have been able to find a landing place within fifty yards of the dead animal practically every time. Skiles has had so much practice shooting while flying that he often picks off a coyote with the first shot.

Crew Member Saves Army Blimp

BY BRAVING a raging storm to hand crank the engine of an army blimp while in flight, Sergeant Frank D. Neff of the 2d Balloon Company at Pope Field, North Carolina, won an official commendation for bravery.

Neff and his comrades, crew members of a small blimp were caught in a severe storm over a dangerous mountain region. At the height of the storm's fury both the right and left engines stalled. The right engine was finally started from the control car but the left remained silent. Neff crawled from the warm cabin, fought his way to the engine outrigger and turned it over while the craft was tossing and rolling before the wind.

The letter of commendation was written by Major General Benj. D. Foulois, new chief of the Army Air Corps.

A New Type Parachute Flare

CAPT. C. F. M. Chambers, a former member of the Royal Air Service and a World War Ace, sailed on the S. S. Berengaria to test his new type flare in mid-Atlantic.

The new flares, that range from 50,000 to 500,000 candle-power, are of radical design. Their chief characteristic is the delayed ignition of the flare after the projectile is ejected from the flare pistol. Another interesting item is a modified parachute which, it is claimed, will keep the flare in the air for as long as three minutes.

Shooting the parachute flare into the air by means of the special pistol.

European Experts Discuss the Tail-First Plane

by HANS F. KUTSCHBACH

An interesting interchange of ideas on the subject of "Canard" or the socalled tail-first type of airplane which has recently awakened so much interest in aviation circles.

IT WAS not a long time ago that the experiments with the "Canard" or backward flying monoplane, called the "Duck", awakened the greatest interest. Indeed, it has been astonishing, that the German airplane designers picked up this old idea of Orville Wright.

The construction of the airplanes of today are at the dead point. It does not seem possible to develop the machines further. It seems as though all possibilities have been weighed and exhausted.

Now, suddenly, several German airplane experts went back to the first flying principles and placed the stabilizer in front, just as Wright, Farman and Voisin did in the beginning of aviation. It may be remembered that in 1911, Prof. Junkers of Dessau had the idea of building the all-wing airplane and at that time obtained several patents on this construction. However, 20 years passed until he could take up his old idea. Now he tries to realize his ideas. He said:

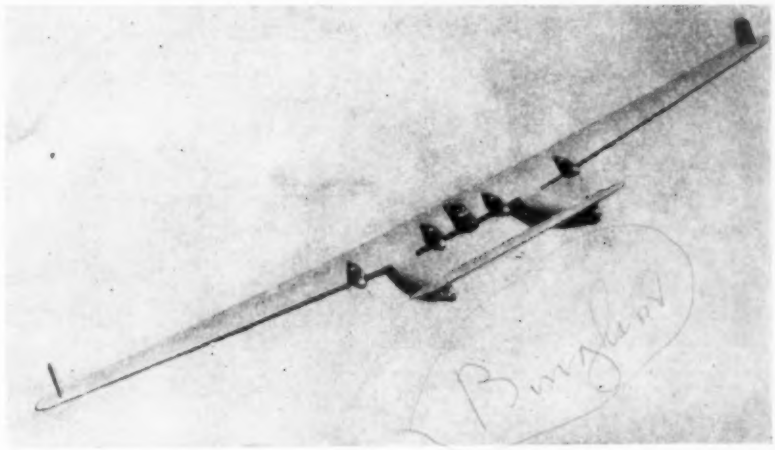
"I have always had the opinion that the airplane form of today is in no case the ideal. The final type that gives the best technical result would be an all-wing plane with the stabilizer in front. In this way only will we get the greatest safety with the airplane."

Then, after a while, Professor Junkers said:

"Look at the first airplanes during the childhood of aviation, at which time we see forward stabilizers on all machines."

Mr. Wulf, the designer of the "Ente" (Duck) said:

"This is not a new idea, for one of the first flying machines was built with forward stabilizers as did Prof. Reissner and then the Frenchman Voisin in the year 1910 and 1911."



A proposed giant German Canard ship is pictured as flying from left to right and tail first. This is an advanced design of which the actual performance is only estimated.

After the death of Mr. Wulf, the Focke-Wulf works made new experiments in the celebrated laboratories of the University of Göttingen. There the engineers devised the aerodynamical properties of the so-called "Ente" or "Duck", which is to be seen in our pictures. This airplane is said to be proof against the fault of over-controlling with the elevators, and further, it is proof against tail-spins.

If the inclination of the elevators is too great, the front surface comes up unconditionally and automatically quicker than the main-wing at the extreme point, and in consequence it is impossible to make mistakes, because an excessive angle cannot occur.

The wheel is several feet in front of the gravity. Therefore, it will be really impossible to nose-over when landing. Furthermore, the huge new monoplane of Professor Junkers is fitted with heavy oil engines. Very many experiments were made with this machine. The result of incorporating a Junkers engine of this type will also be noted in the increased simplicity, reliability of flying and general manipulation. As this heavy oil engine works with a comparatively high compression, it will start immediately even at a very low outside temperature.

The temperature of the compressed air in the cylinders, by which the heat of ignition is generated, is always higher than the ignition temperature of heavy oil. The engine can accordingly be depended on when at great heights or in intense cold. The Junkers heavy oil engine has been tested at 7000 metres above the ground at a temperature of minus 35 degrees Celsius, and functioned perfectly. The engine can be regulated by a lever when flying which automatically controls the quantity of fuel being sprayed in the cylinders. No other controls are required in the cockpit.

Judged by international standards, the output of the new Junkers heavy oil engine is 720 h. p. at 1700 r.p.m., with a weight of 800 kilogrammes. This relation between weight and output is equal to that of an ordinary water-cooled engine. Official tests have shown that the consumption of fuel under full-load is 166 grammes per h. p. hour. Curiously enough, and in contrast to carbureter engines, the consumption of fuel is not increased with a decreasing load, but drops until it reaches the most economical figure of 158 grammes per h. p.

This Junkers heavy oil engine is a great step to the All-Wing plane and

A practical flying Canard, the "Ente", designed and built in Germany by the Focke-Wulf works. It has made many long and successful flights.

The control room or pilot's cabin of a large German Canard now under construction.

we will see if it becomes necessary in the near future.

Another celebrated airplane designer, Dr. Ing. E. Rumpler, is now busy with his new trans-oceanic flying boat. I asked for his ideas and he answered:

"My dear Kutschbach: The question is very difficult indeed. In all my constructions I ever pressed the idea of giving the body a streamlined form and I found that the front rudder does not give the expected advantage. However, I don't know. It may be that some day other German airplane designers will take up this idea anew. Many things are against a front stabilizer. In each case, with my new trans-ocean flying boat which is now under construction, the rudder and the stabilizer will be on the tail at the rear end of the fuselage."

Then I asked Mr. Rohrbach, the well-known German seaplane designer, who said:

"From the technical point of view, the arrangement of the stabilizer and elevator in front of the wings is a very interesting experiment, and as such, it is in line with the progress of the airplane. However, I don't know, I don't believe that the advantages will be sufficient enough to make it worthwhile."

Furthermore, it may be remembered that the huge antediluvian flying beasts possessed, so as to speak, forward stabilizers, using the long neck as rudder. Today we still can see it in the case of the storks, the swans, pelicans and other great birds.

In each case, steering with the forward stabilizer and elevator has recently found a lot of new friends in Germany and it is expected that America will follow this example very soon.

* * *

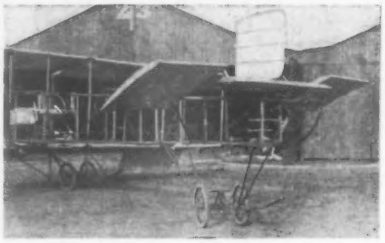
EDITOR'S NOTE. While the many accidents attending the use of tail-first ships in the early days discouraged the work along these lines before the war, yet the canard has many good points.

In the first place, the canard is an ideal ship for use with pusher propellers, and the pusher propeller has much to recommend it on the score of efficiency. The canard type also favors an effect "fore-and-aft dihedral" which also has its good points.

Experimental work along this line, if carefully conducted will be almost certain to uncover facts that will be favorable to the canard.

Above—The Focke-Wulf "Ente" in full flight—tail-first.

At the right is the original Model "A" Wright biplane with the rudders and biplane elevators in front of the ship.



The front elevators of a French Voisin plane —a very early type.

A Farman biplane with the fixed surfaces behind and the adjustable control surfaces in front.

Washington Bicentennial Model Tournament

BOYS! Here's a chance to win a flying trip in a tri-motor to the National Air Races in Cleveland with all expenses paid. Second Grand Prize, a $50.00 Wrist Watch. Third Grand Prize, a silver trophy 18 inches high.

These prizes are offered by the Sixth Corps Area, U. S. Army, in their model contest held June 24, to July 4,, inclusive, at Soldiers' Field Stadium, Chicago, Ill.

In addition, there are 50 other valuable prizes to be awarded. Each model builder entering will receive a complimentary ticket to the tournament by the courtesy of Major General Frank Parker, Commanding. Contestants are required to build one of the following models:

Stinson.	SE-5.
Hawk—P6E.	Fokker Triplane.
Hell Diver—02C2.	Lockheed "Orion."
Texaco Mystery "S."	Lockheed "Vega."

The wing span not to be less than 22″ and not over 30″. Prizes to be awarded for the best models in workmanship, neatness, completeness and flying quality.

England May Drop Cup Races

THE Schneider Cup races have outlived their usefulness, Sir Philip Sassoon, under-secretary for Air in Great Britain, told the House of Commons recently. In late years they have been extremely costly both in human life and money.

This was the theme of his speech to the House in recommending that no further appropriations be made for building planes to compete in the races, or for incidental expenses in conducting them.

Although aviation experts in general agree the Schneider Cup races can do little for the industry in the future, their past value undoubtedly has meant much to British and to world airplane and motor design, both in the military and commercial field.

It is now hoped that a competition on somewhat the same international scope and with a like meaning for the progress of flying as an everyday affair may be developed in the Thompson Trophy, the banner contest in the Annual National Air races at Cleveland. This is a race for land planes, whereas the Schneider Cup events were for seaplanes. It should stimulate advances in the streamlining and aerodynamic design of wheeled types.

This is more or less the history of automobile racing repeated. There were many auto races when the car was was being introduced, but instead of assisting sales, the many accidents hindered development.

Are Present Laws Fair to the Pilot?

by CAPT. CHARLES W. PURCELL

"No," says the Captain, who proves conclusively that the commercial pilot and private airplane owner bear the brunt of the Department's displeasure.

THE master pilot for the Whoosis Air Lines rushed into the company office looking for his weather report and several dozen other things necessary for his coming trip.

This weather report requires much concentration on the part of the pilot. He must check every foot of his trip with the report and when he gets through with this he finds himself in a flat spin. This report may be several hours old and about as useful as an extra pair of ailerons.

While he is in this state of mind, some one of the office force hands him the load sheet for his signature. This sheet contains the list of passengers and their weight together with the weight of anything else going on the trip. The pilot signs his name on the dotted line while he is still thinking of his weather report.

The average layman or non-flyer will never understand how many very necessary things are in the mind of a pilot before one of these trips and it would be almost impossible to give the reader an idea of the mental gymnastics his mind completes before he is finally ready. The lives of his passengers are continually on his mind and the bad spots along his route make the trip anything but a pleasure.

When he leaves the ground, his mind must be made up as to the course he will take, how high he will fly and just how much speed he will have to make to get around storm areas approaching his course. He usually is accompanied by a co-pilot but this party may only be one of the four-hundred-hour men and just another responsibility so far as the pilot is concerned.

This load sheet is then placed in the ship with a few dozen other papers and the pilot starts on the run. Responsibility hangs heavy on his shoulders. He can turn to no one now for help. He must make his decisions (providing the dispatcher allows him this privilege) and he must be right. If the reader has a little imagination, he or she may get a little idea of what the pilot goes through, by trying to place themselves in his position.

HE FINALLY slides in to his first stop and everything seems to be going along hunky. He missed two bad storms on the way by some good headwork and the rest of the trip will be duck soup. As he cuts the motors and steps from the ship he is greeted by a nice big Department Inspector.

"Hello, Jimmie," says the inspector to our pilot, "Let's see your load sheet." The pilot hands this to him after returning his greeting, and the eagle eye

Gassing up the ship before taking-off with the pay load of passengers. The responsibility is now the pilot's.

of the inspector scans the sheet and finds that the ship is overloaded several hundred pounds.

From here on, gentle reader, we will just tell you what takes place. The pilot is "grounded" for an indefinite period and, if the inspector happens to have a grouch on, he may stick a fine on Mr. Pilot just as a matter of principle. In this case there must be a goat, and the pilot is elected the horned animal.

It never seems to enter the mind of the department inspectors that the load sheet was written up by the office personnel of the company. The only thing that these pencil pushers have to do is to add several thin columns of figures daily and check the totals with the payload of the ship. Then again, maybe the inspector knows who is to blame and finds he has no regulation to cover the guilty parties.

This is just exactly the state of affairs. The most he could do to the airline is to ground the ship for a few days. In other words, if the company can get by with an overload they win and if they can't, the pilot is the loser.

That is one side of the affair. Here is another. Our pilot may have known of the overload and may have informed the office force of the error. Then, again, he may be a wise pilot and say nothing about it. If he refuses the trip, his name will be mud in aviation circles. If he takes the ship out his name is mud, anyway, with the Department.

So, what my third wife wants to know is—why does the Department have to put the pilot "on-the-spot." Are they afraid of the big mail and passenger trust that controls most of our airways, or do they lack legislation to take care of this fast growing octopus?

PILOTS in this country seem to think the Department lacks teeth in its legislation and the writer is also of that opinion. Everything in the Department's rulings seems to hinge on the pilot but the Department does not, or will not, see the rope around the neck of Mr. Pilot. The other end of this rope is held by the company officials.

Some pilots will deny this, but in their hearts they know just where they stand. They will deny it to keep on the good side of three square meals a day and that is the proper thing to do with the present rulings of the Department. Some day a congressman or senator will start a little investigating and ten thousand pilots will be voting for him the rest of their lives—and that's no supposition.

As most of us understand it, the Aeronautical Branch of the Department of Commerce was to be "a help to aviation," but in the past few years this "help" is just a word so far as the pilots are concerned. They receive nothing but the hard knocks of the business while the honor and glory goes to the company officials. He "puts out" while the company "takes in."

Most of our airlines have forgotten the help rendered by these same pilots a few years ago when junk had to be flown to get the mail through. They don't wish to be reminded of the numerous times that these same pilots gambled with their lives that the airline might prosper. Pilots stuck with the lines through everything—snow, ice, storms and sudden death during these early stages of the flying game. They deserve a lot more consideration, both from the Department and the airlines themselves, than they are now receiving.

These boys even went so far as to try to take a ship off an airport in a blinding gale so that the company could collect for the full trip whether it was completed or not. Few people know that in the early stages of mail flying, the company flying the mail received full payment for a trip if the ship left the field and cracked up a few miles away. The old-timers in the game would help out the companies by making this attempt and very often the results were—sudden death.

As this was expected of the pilot, it

came as no surprise. It was just his sacrifice to the cause.

Phooey, on this kind of treatment. These airline pilots deserve more consideration than this and the writer thinks they are about to get a break. They have recently come together under the wing of some very capable men and here's hoping that these same men get to our legislators with a mailed fist. Go on, you Air Line Pilots Association, do your stuff.

IF THIS side of the story means nothing to the reader, we can take another side—the passenger's. Why should the Department sacrifice the lives of passengers for a few measely dollars? Every time that a passenger is killed on a licensed airline, the Department can be charged up with the death.

The Department may say they are not liable but this does not alter the facts of the case. The duty of this branch of the Department of Commerce is to see that passengers are not allowed to take-off in a ship when the weather is not safe. If they have no legislation, then legislation is needed. If they have legislation, then let this legislation be enforced.

Last winter several passengers lost their lives while flying in "soupy" weather and this in spite of the fact that the Department says that no airline shall allow passengers to be transported from a field with a ceiling of less than 500 feet. It is being done and always shall be done until matters are attended to. In this case the pilot is again the goat. If he takes passengers off the field he alone is liable. The Department says so and the Department can not be wrong. Again, the Department will not try to see the rope around the pilot's neck. The pilot must take-off or kiss his job bye-bye.

This 500-foot law is a joke and here is the nigger in the woodpile. The pilot may take-off under a five hundred foot ceiling and have unlimited visibility at his destination. Then, he may have unlimited visibility at his taking-off point with a zero ceiling at his destination. This is the most dangerous of the two, and the cause of nine out of ten airline accidents.

The Department probably has jurisdiction but if they have it is never enforced on the airline—it is the pilot who pays and pays and pays. Maybe we could stick the pilot in jail or hang him. Perhaps we might compromise and just amputate his leg or take out his right eye. What do we care about pilots—the woods are full of them anyway. Judging from appearances this seems to be the mental attitude of the Department.

Here is another angle that may interest the layman.

SEVERAL months ago the Department licensed a certain low-wing monoplane. An A. T. C. was granted this

(*Continued on page* 64)

A Giant Flying Boat for the U. S. Navy

This gives a good idea of the layout of the U. S. Navy's monster seaplane, and the peculiar arrangement of its engines.

A MAMMOTH flying boat, of the trimotored sesquiplane type, has been delivered to the Anacostia Naval Station. It has a wing span of 100 feet and is powered with three Wright "Cyclone" engines, which give a total output of 1,800 h.p.

It holds two records. First, it is the largest flying boat ever received by the Navy. Second, it is the first all-water plane to make an overland flight across the mountains from Buffalo, N. Y., to Washington, D. C. It averaged 135 m.p.h. on this flight.

And Here We Have Dug Up the Akron's Ancestor!

by JACK CLARK

THE other day, I was looking over some old magazines from a collection that belonged to my great-grandfather, John Underhill, who was the first maker of edged tools in America.

Of all the articles and woodcuts of a by-gone day, to me the most interesting and—yes—the most romantic, was a prophetic piece accompanied by a woodcut showing the latest model of that day in "dirigibles". The account appeared in *Gleason's Pictorial Drawing-Room Companion*, issue of Saturday, January 10, 1852.

I quote it in full in the following paragraph; the illustration herewith is a pen-and-ink copy of the original woodcut. The title and quotation of the item follows:

"Petin's Air Propellor. M. Petin, an ingenious Frenchman, has just invented what is termed a 'System of Aerial Navigation,' by which he hopes to attain the long-desired power of rendering the balloon subservient to our will. As we yet have but the instrument; it is necessary to know how to make use of it, to subdue it, to direct it in fact, else we shall continue to have nothing but a toy upon our hands.

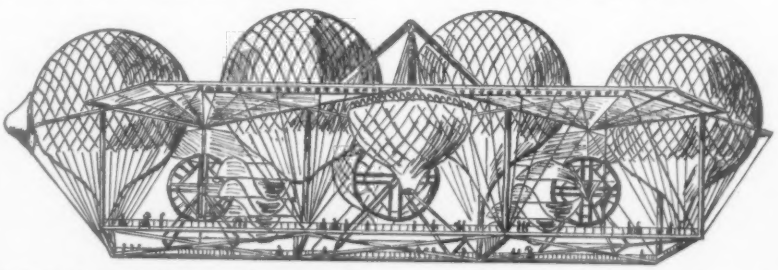
"This, then, is the problem, to solve which many illustrious dreamers have dedicated their studious hours, without having as yet obtained the results for which they labor.

"Whether M. Petin's invention is destined to succeed, is yet a problem; but we doubt not that the thing will be ultimately consummated. Hitherto the obstacles in the way of its success have been great, but an indomitable spirit of perseverance will triumph.

"By the way, what has become of the Hoboken flying machine? Is the enterprise abandoned?"

Now, as I myself finished reading this fascinating bit of news reporting from a day of lavender, beaver hats and parachute dresses, a most striking interruption occurred. A knock at the door announced the arrival of a friend, recently versed in the art of mechan-

(*Continued on page* 59)



A flock of spherical balloons tied together with a bridged frame and propelled by windmills was the dream of M. Petin, in the year 1852.

How to Break Into the Flying Game

by "AN OLD-TIMER"

Don't think that a few hours training on a flivver plane will entitle you to big-time piloting on the airlines, even though you do have the required number of hours. The "Old Timer" knows by bitter experience that only the most thorough training will lead to a mail hopping job.

A collection of aerial traffic "stop-and-go" signals, and meteorological instruments indicate the complexity of the commercial flying game.

IN securing air mail jobs for pilots or mechanics one must have a clear personal and flying record. If he is not a graduate of the United States Government service, he must be a graduate of some responsible Government rated commercial school. Not one of these small town schools, or big city hay wire schools. There are only a few good schools that are recognized by mail and transport companies. This being a fact, I would advise any one desiring to bust into the mail pilot or mechanic game to make up his mind what company he would like to tie up with. Go to them and find out what school they recommend. Many times, however, it is a tough job to get a mail company to recommend a school. They will tell you to hook up with some large, well-rated school. Whatever you are told, don't make a mistake and go to some cheap school. During the time at school it is a good plan to keep in touch with the flying company you have in mind. Let them know how you are getting along, and if the flight instructor drops a few good words to your prospective company, so much the better.

The first question a mail and transport company's Superintendent will ask a newly-made transport pilot is, "Where did you get your training?" If you say this, "I put in my time with John Doe over here in a small training plane," he will ask, "Did you put in all your time in that one ship or others like it?" "I flew only three different ships, but they were all of the training type."

"Well, Mr. Man, I'm afraid you haven't had enough experience to handle our ships. You'd better put in some more hours on some other job."

"You mean to tell me," the pilot shouts, "after spending two thousand dollars to learn how to fly that I can't fly your ships? Why, my instructor was a cracker jack."

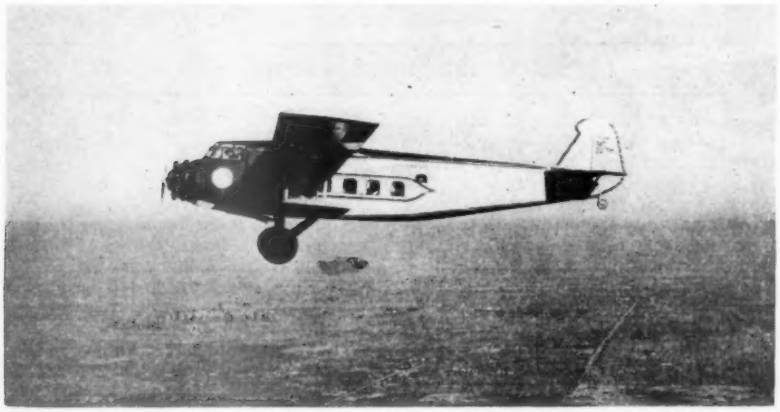
He'll come back with, "Just a minute, Mr. Pilot, I'll tell you something. Only ten per cent of all the air schools in the United States can really instruct men to our requirement.

"I'll tell you what we require. In the first place our ships can cruise along at a hundred and twenty to one hundred and forty. That means a three hundred to five hundred horsepower motor. Our ships are heavy. They take off from nearly sea level up to seven thousand feet. Our pilots fly at night as well as by day. They fly in all kinds of weather. Now, how can you do this when you have learned in some one-horse school? Why didn't you go to a school that trained you in four or five different types of ships, from the small trainer to the six-passenger closed job?

"A school that would give you at least fifty hours of cross country flying in the dark, with a full load of sand instead of passengers. Also a plane that could be completely closed in from seeing old mother earth. These are the things, my man, that our company requires. I cannot give you any more of my time. However, go to some good school and get these requirements, then come back and see me.

"You have plenty of nerve to think you could fly our mail after going through such a poor school, and in conclusion I want to state, Mr. Pilot, I don't blame you. The country is full of men like you. There are many poor schools, but the day is coming soon when these one-horse schools will be out of business. Then we will have wonderful, reliable men. Good day!"

This is one of the factors that cause passengers and mail transport com-



Flying passengers and mail on schedule, as with this Boeing transport on the United Air Lines, calls for careful training and extended experience.

panies to have that sign hanging in their offices which reads like this, "No pilots wanted." You cannot blame the companies. It takes a field manager a long time to convince a newly graduated pilot how terrible he is. In concluding the pilot's side of the story, I wish to say this: If you have received your training outside of the government service, and you have no inside pull, it's a long, long ways from being a bed of roses in obtaining work with less than a thousand hours. Think this over and see for yourself before you make a mistake.

As for the engine mechanic, he hasn't such a hard road to travel. His first year or year and a half is the worst. The mechanics, I find, get by the easiest in every way.

Are the young men that stick around an airport for a year or two working for nothing? The Federal law requires one year of practical and thorough experience. This seems to be easy. A man has to start in with a transport company as a grease-monkey or handy flunky. After a year or two he takes the examinations. If he passes he can demand first-class mechanic's pay He will probably get it every time.

Now you ask why. As I said before, a very small percentage of schools are equipped to give a first-class engine course. The trouble with ninety per cent of all schools is they haven't the practical engines to work on. That is, in this way: Most of their engines are small jobs, others small water-cooled jobs, and, again, the large engines are old stuff that they keep on tearing down and building up.

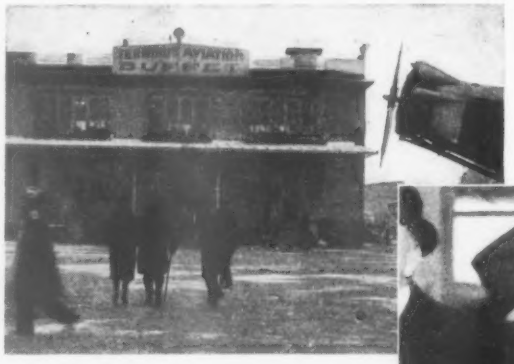
As for the grease-monkeys, they get real hot stuff to work on and all big jobs. There are only two popular makes of engines being used on transport work. Training on these engines is what these companies require. They hire a grease-monkey, break him in to their routine and, after the required time, he passes the examination and receives his first-class pay.

When a transport company really needs an engine expert, they send for a factory trained engine man. This is the best place to learn engines that I know of. Factory engine service men are in demand at a high salary. This factory man employed by the transport company, as a rule, becomes chief mechanic. He, of course, herds the grease-monkeys around the hanger. However, if the monkey keeps his eyes open, he will soon learn, and be in two hundred dollars course money.

Another thing, after the time required by the Federal law he passes examinations. He can quit his present company and secure a position with another as a first-class man. His new boss will ask him, "Where did you get your experience and who did you work for?" "Well, I've been working for John Doe Company over here." "Well," the boss' reply is, "if you can work for them I guess you can work for me." However, this does not happen every

(*Continued on page* 56)

Air Customs Inspection in Paris



At the left, is the aerial customs office at Le Bourget Field, Paris, where passengers from foreign countries must be searched for contraband.

Below, a customs officer searching an air tourist's luggage.

DURING the last few years, flying has become so popular in Europe that the French government has established a customs office at Le Bourget Field in Paris to handle the air traffic.

As each plane arrives, a group of inspectors are on the job to see that contraband is not being smuggled. No one is allowed near the plane as it lands but the necessary mechanics and the government men. A man stands by the plane as the passengers get out, carefully looking them over and cataloging them mentally.

Much of the work of the inspectors is saved by this man. He is on the lookout for criminals and others, who for some reason or other, are wanted by the government. He can also tell with fair accuracy, those who might be smuggling. Customs inspectors have a peculiar sense that enables them to know whether or not a man or woman is smuggling.

The passengers and mail are taken into the customs building for the inspection. All luggage is opened up and the contents carefully inspected. When the inspectors deem it necessary, a passenger may be taken into a special room where his clothing is removed and examined.

Mail and freight packages are carefully opened and examined. In France, certain kinds of literature is contraband, and almost all books are subject to duty. Scientific books, whose contents are known to be incorrect, are not only contraband but the sender is liable to a heavy fine.

Many of the leading merchants of jewels are sending their merchandise by air. There is less chance of theft. There is a large duty on such things in France and the customs bureau at the airport collects it.

The French customs officers are noted for their efficiency and at the same time for their courteousness. They can go through a suitcase, overlook nothing and yet the contents are not mussed or disarranged. No matter what happens they do their work well and the traveler is but slightly inconvenienced.

What is the Future of Aviation?

MANY aviation experts have expressed themselves on the future of flying, and most of them have predicted revolutionary changes, but Dr. W. F. Durand, emeritus professor of engineering and a member of the National Advisory Committee on Aviation, believes aviation progress will be much less sensational in the future than in the past.

The biggest advancement, Dr. Durand believes, will be in the adaptation of the airship for trans-oceanic commercial and passenger flying.

As for the airplane, he believes:

That fog will continue to be the greatest hazard, but that through perfection of radio and the altimeter, blind flying some day will largely eliminate this problem.

That there is a good prospect for the replacement of the gasoline engine by the oil-burning engine because the fuel is cheaper, fire danger is lessened, speed is greater, fuel tanks smaller for the same weight and the spark ignition is eliminated, which will mean improved use of radio.

That there will never be competition between airship and airplane companies, because each type of machine has its own field—the airship for distance work and the airplane for short distance speed trips with stopping points.

Taking Care of the Lightplane Engine

Grinding valves on a lightplane engine is one of most important tasks.

THE engine of a lightplane is too expensive a piece of machinery to shorten its life by abuse. By observing a few simple rules in starting and running, it will give the maximum of satisfaction and service.

Never open or close the throttle suddenly when the engine is running. The sudden changes in temperature resulting from this practice will cause warping of the parts—especially the valves. Most valve trouble is caused that way. Only a slight warp in the valve will cause it to burn—and a cylinder starts to miss. Sudden changes in temperature set up strains and possibly permanent damage in other parts of the engine.

In warming up the engine, do so gradually, letting it run just fast enough to keep all cylinders firing. It may be necessary to run it a little faster in winter. However, bear in mind that when the engine is cold the oil is thick, and if the engine is accelerated too suddenly, there is a possibility of cavitation in the oil line. When the engine is well warmed up, gradually push the throttle wide open for a short time to see that it is running o.k., but remember that prolonged running at full throttle, on the ground, will overheat the engine.

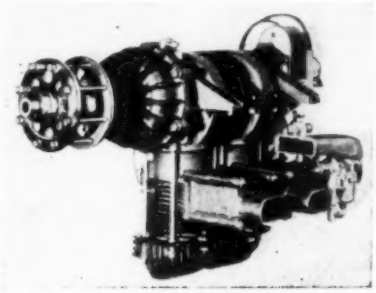
Unless absolutely necessary, never open or close the throttle suddenly when taxying or taking off. There is no use to. Do it gradually and the engine will last longer.

Keep the throttle partly closed when flying. In addition to preserving the engine, this will lower the gas consumption and make the ship easier to handle. Never race the engine. Don't side-slip or nose down with the engine open.

When closing the throttle, do so gradually. Otherwise, the usual result will follow—the valves will cool too quickly and warp.

Flooding is one of the most common mistakes made in starting an engine. When priming, have the throttle nearly closed and waste no time in making "contact". Just a short time is sufficient to cause the gasoline vapor to condense in the cylinders and manifold when the engine is cold. The usual way of clearing a flooded engine is by turning the propeller backward.

When the spark plugs are fouled it is almost always due to abuse in the air. They may be fouled on account of the pilot's carelessness no matter how well the engine may be adjusted. Always keep the engine warm while gliding. On an air-cooled engine, the temperature may be kept up by maintaining the proper idling speed. Of course, the radiator shutters may be used for this purpose on a water-cooled engine. Also open and close the throttle at frequent intervals during the glide in order to keep the cylinders clear. If the engine cools off too much during the glide, the pistons contract and are likely to pump oil into the combustion chamber, fouling the plugs.



A typical two-cylinder lightplane engine of the air-cooled inverted type.

Another cause of engine trouble is a poor mixture due to an incorrect adjustment of the carbureter. Poor mixtures will cause overheating, spark plug fouling, oil pumping and about every other engine ill known to science.

Carbureter adjustments should only be made after the engine has thoroughly warmed up, because conditions change when the carbureter is adjusted cold. Black smoke indicates an over-rich mixture. Carbureter popping and loss of power means a weak mixture.

Bear in mind that a cold engine does not usually answer readily to the throttle, so it is well to keep the temperature from dropping too low when gliding if for no other reason than to facilitate a sudden application of full power in case of emergency.

The modern lightplane engine is a dependable power plant and will give long and faithful service if handled properly. If a good engine fails to give satisfactory performance, it is a sure sign that somebody is careless.

Women Who Work on the Akron

Girl inspectors working on the inside of the Akron, searching for leaks.

JUST as an automobile carries spare tires, so an airship carries spare gas cells.

The dirigible Akron, with its 12 cells, carries six spares. And though airship building may sound like a man's job, there are today 20 energetic overalled young women working on these spares and still others for the new airship Macon.

It takes keen-eyed and conscientious workers to inspect these huge cells after they are finished. There are 6,000 yards of fabric in each cell and every yard has to be looked over inch by inch to be certain that there are no weak spots or pinholes in the cloth.

One girl gets inside a cell, while another takes a strong light and circulates it around the outside. The light shows up every thread of the fabric to the girl inside, who immediately tapes or reenforces any bad or weak place she discovers in the cloth. In order not to injure the delicate fabric of the cells while working upon them, the girls remove their shoes and wear cotton slippers or strips of cloth strapped to their feet.

Since these are Navy ships, a Navy inspector joins the girls on the final tour of inspection.

Meanwhile another group of inspectors are going over the 6,500,000 rivets used in the framework of the U. S. S. Macon. Each of these tiny parts has to be subjected to close scrutiny before it can be used.

Constant vigilance is the price of safety in the air, and this is particularly true of dirigibles with their almost countless numbers of small parts, any one of which might disable the entire ship.

A Reader Disagrees With P. A.'s Stand

A letter from W. G. GOLIEN

POPULAR AVIATION,
Chicago, Ill.
Dear Editor:

As you claim, POPULAR AVIATION is a widely read aeronautical publication. It is read by a large number of people, both old and young, who are interested in American aviation in one way or another. A great many thinking readers form ideas and base opinions concerning the aviation industry in this country on what they read in POPULAR AVIATION.

Because of this dependence placed in POPULAR AVIATION by its readers, it bears the important responsibility to its readers and the industry of furnishing as accurate and truthful a picture of American aviation as it is possible to do.

For this reason, two misleading articles that appeared in the May issue should be corrected before they do more damage than they have, unfortunately, already wrought.

The first article was entitled "Feeding the Favorites," by Walter W. Liggett.

Mr. Liggett, after diligent and careful investigation in Washington, claims to have discovered startling and vicious secrets concerning the entire aviation industry in America. His article reveals these dark secrets in dramatic fashion to absorbed readers who will be led to believe that our whole aeronautical structure has been built on and is maintained on principles of graft and selfish gain.

This is not a pleasant picture to inflict upon a struggling young industry. Worse yet, it is unjustified and unfair.

Men who have spent the past several years of their life devoted to the cause of the industry, in one capacity or another, in the military services or in civilian life, men who know and understand American Aviation, have known for a long time every one of Mr. Liggett's startling revelations. They have known these things and many truths besides, of which Mr. Liggett is apparently entirely unaware.

These men know, and have known for years, that the Army and Navy have bought and are buying practically all of their airplanes from only five or six different manufacturers, simply because these manufacturers possess the engineering talent, the experience and the equipment to build the best planes that are built in America.

IT is common knowledge that practically every manufacturer of any importance has been given an opportunity to demonstrate his ability to build a better plane, fighting, observation, bombing, or any other, than is now in use by U. S. Military forces.

It is well known that the Army and Navy, as well as commercial airlines, buy nearly 100 per cent of their aircraft engines from Pratt and Whitney Aircraft Mfg. Co. and Curtiss-Wright Aeronautical Corp., for the splendid reason that these manufacturers build the finest airplane engines of the larger horsepower sizes that are built in America.

(*Continued on page* 59)

Flying Steadily Since 1924

The venerable Dornier flying boat, the "Delphin" which has grown gray in service.

SINCE put into regular service, the flying-boat Dornier "Delphin D. 277" had carried out 8,128 departures and flights at the end of last year's flying season.

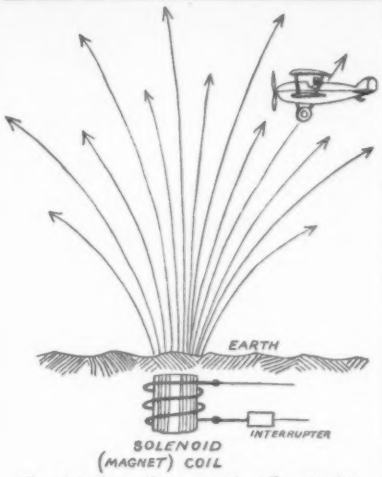
Built in 1923-24, "Delphin D. 277" saw its first service on the night-route of Stettin-Malmo-Kopenhagen with the Aero Lloyd concern. It was then used, since 1925, on Lake Constance for joy-riding purposes.

During the last seven years, 7,968 flights were made by the well-known pilot W. Truckenbrodt and 18,575 passengers were transported.

The flying-boat Dornier "Delphin" carries five persons and is equipped with an engine of 260/300 h.p., built by Bayerische Motorenwerke, München.

It is an example of the worth of good workmanship, and careful handling.

Magnetic Landing Fields



Showing how the magnet coil operates.

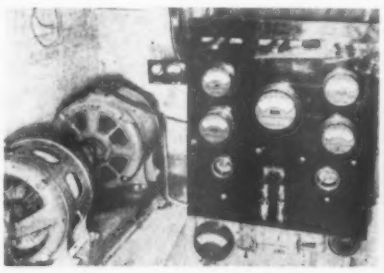
AIRPLANE pilots, flying blind in a fog and seeking a landing, may soon be assured of safe contact with the ground by means of a magnetized landing field. Army Air Corps engineers conducting experiments with the magnet at Patterson Field, Dayton, Ohio, believe that the device will lessen the number of airport crashes and insure greater safety for the passengers and pilots.

A strong magnetic field, extending five miles from the center of the landing area, is made possible by a series of cables laid in circular formation beneath the surface of the landing field. A continuous dash-dot-dot signal issuing from the magnet will inform the pilot that he is nearing the airport.

An indicator on the instrument board will point to zero if he is headed toward the center of the landing field. If he swings to the right or left, the indicator will point accordingly.

As soon as the pilot has crossed the boundary line of the airport, the signal changes to an uninterrupted "dash" sound, and after he is within the field, the signal becomes a "dot-dot-dash". When the pilot hears a "dot-dot" signal he will know that he has reached the range for leveling off, and as the auditory dots grow sharper, the stick is slowly pulled back and the plane comes to a safe landing.

Electric current passing through two loops on the plane gives the reception.



The motor generator and the switchboard employed for supplying current.

Our Trip From Berlin to London

by J. ADIN MANN

Timid and excited when they got on board at Berlin, our friends soon relaxed and enjoyed the novelty of their first air voyage.

"TRANSCONTINENTAL plane crash kills six," I read aloud from the Paris edition of the New York Herald. I'll admit that there was a slight quiver in my voice.

"Still it doesn't cost any more to fly from Berlin to London than it would to go first class by train and boat," said Mildred, my wife, not at all disturbed by the report I was reading.

"And we have our wills made," I agreed sadly.

"And besides we already have our tickets bought."

"Tomorrow we fly. I hope the wind isn't blowing."

"Our first flight in an airplane and to think that we will fly over 575 miles the first time. It will be thrilling."

"Should we cable the folks?" I said gloomily.

"Don't be silly. Cablegrams cost money and besides they don't even know we're going. So why worry them."

"Let's do something gay tonight," I said, resigning all responsibility. "For tomorrow we fly."

I was up early the next morning to see about the weather. It was a beautiful bright morning, but my heart sank as I heard the wind blowing. It was blowing hard.

"Mildred," I said deathly quiet, "the wind is blowing."

Mildred laughed at me. "All the more interesting," she said.

We packed everything in our portmanteaux and went downstairs. As I was checking out I leaned over the desk confidentially.

"You know, Jerry, we fly from Berlin to London this morning."

The jolly fat German clerk shrugged his shoulders belittlingly.

"Zat ist nossing. Many times dat flight I've made, mein herr."

Here we are. The intrepid passengers and pilot, "standing-by."

The author of this sketch, concealing his inward feelings.

I looked at him coldly. "Yeh! But you had to, my lad, you had to. This isn't war time and there are trains and boats running."

"It ist nossing, I tell you. Nossing at all. A few hours. Hein! Ach! There is London below."

I considered deliberately. "You mean that planes never crash on that route?"

"Vell," the German shrugged his shoulders, "two last year in storm. But Deutsche Luft Hansa she look after you, mein herr. The best airline in der welt."

I shook hands with him silently. "Well, it is something to remember if we crash . . . that we've crashed on the best airline in the world. We'll stay at your hotel the next time we are in Berlin . . . that is, if we get to London."

At the ticket office at Templehof airport we met a very polite chap who informed us in perfect English that our two portmanteaux were too heavy. It cost us ten dollars extra to have them ride along with us. At that we beat the airplane company out of a few pounds. I weighed 235 and my wife weighed . . . well . . . like ages, husbands should never tell on their wives when it comes to weight. But we paid no more than two other chaps who weighed in the neighborhood of 135 each.

"Put on plenty of those stickers on the bags," I said sadly. "I want some service stripes to show my friends if we get to London."

We wandered out into the great open air restaurant with its multitude of gay umbrellas.

"Well, let's have breakfast," I said a little more cheerfully. "It is lots better to fly on a full stomach, someone told me."

A radio was playing from a big signal tower near by. A waiter took our order. Our umbrella flapped lazily in the breeze. It was a warm day, a lazy day . . . not at all the kind of day one would wish to crash in an airplane. You needed a dirty day, a cloudy day, a stormy day for that kind of thing.

The coffee and rolls were delicious. I drank five cups of the strong liquid and knew at once that I should have consumed only four. My stomach felt full, as though if someone hit it a good wallop it would turn over.

A big plane circled overhead, droning lazily. I watched it through narrowed eyelids. The wind didn't seem to bother it much. In a yard to our right was a big flock of the sky birds warming up. Little fellows, big fellows, medium sized fellows. I tried to pick out the one that would carry us to London, but gave up. They all looked about equally as safe.

OUR plane was to leave at 12 o'clock and at 11:45 we were waiting at the barrier to get out on the field. Planes were landing and taking off out there at regular intervals now. One plane stopped on the concrete runway a short distance from the gate before which we were standing. I noticed its passengers got out of the plane slowly; stood for a moment, as though to get their land legs, and then stagger slightly as they walked towards us.

Two chic French girls passed close to us. One of them was telling a man

"My wife, Mildred", referred to from time to time in this article.

who had come to meet them about the trip. Her hands were flying up and down expressively and her eyes were big.

"Bump—a—d—bump. O-o-o-o-ola la."

"She said it was a little rough," my wife translated for me.

"O-o-o-o-ola-la," I shouted.

At last the barriers fell and we were off to a flying start. They strapped me in my seat and pointed to a parachute in a rack above my head.

"Mildred! They haven't told us how to use the parachute."

Mildred laughed. "If the plane starts to fall we'll find out soon enough. Aren't you thrilled?"

"I wish I hadn't had that last cup of coffee," I moaned.

There were four other passengers besides ourselves. They got in and sat down as though riding to London in an airplane was like commuting from Brooklyn to Manhattan in the subway. I noticed that only one strapped himself in. A boy passed out a small package of gum and some cotton to each of us.

"I say, chappie," said the Englishman behind me, "you put the cotton in your ears and chew the gum."

In my nervousness I put the gum in my ears and started to chew the cotton.

"The gum is good for air sickness," the man kindly explained.

I looked at Mildred in startled amazement. "My gosh, do people get seasick in airplanes?"

Mildred laughed at me. And I knew why. Coming over on the boat I was seasick . . . very seasick. Mildred never got seasick. She could laugh. I commenced to turn green at once. That extra cup of coffee seemed to press against my Adam's apple. The roar of the great engines starting up brought me out of my fear for a moment. They made a powerful, pleasant sound against my cotton plugged ears. They would carry us through the air easily, I thought, and if one failed, well, there were two more. I looked over at Mildred. She had her little camera in her hand and her face was aglow with the anticipation of her great adventure.

I suddenly felt the big plane move under us. We taxied slowly down the field, until we had reached its farther end, and then turned. What happened in the next few minutes I've never quite been able to figure out. The brute of a plane seemed to leap down the field in giant strides. The noise was deafening. The airport flitted past in a blur. We bore down at a terrific rate directly at some buildings. I shut my eyes and cringed.

When I opened them a moment later, because the noise had ceased somewhat, we no longer were on earth. The streets of Berlin, like a straight phalanx of soldiers, were marching past under us. We were in the air. At last we were flying. I grinned across at Mildred. This wasn't going to be half bad. Mildred grinned back and stuck that foolish little box camera up to the glass of the window and closed the shutter.

It turned out later that she took a perfect picture of the city of Berlin as seen from the air.

WHEN the confines of Berlin were left behind and the perfectly plotted fields and forests of Germany appeared below us I was conscious that something was the matter. I watched a tremendous rubber tired wheel just outside my window. Before my startled eyes it flew up almost out of sight and then bounced back again. Every time it did that the plane jarred, just like a car does when it goes over one of our North Dakota farm roads at full speed. Up and down . . . up and down . . . that wheel went, and every time it did that the fifth cup of coffee I had consumed knocked against my Adam's apple.

"Look—look—down there!"

I managed to look down. A forest was on fire, the white smoke puffing up

The air views over Berlin were picturesque and beautiful.

towards us. A river ran through the forest. The whole became a blurred mass. On the front of my seat was a rack containing waxed paper sacks.

"Oh Lord," I moaned to myself. "Other people must get airsick too."

I took out one of the sacks tentatively. I felt a hand on my arm. I was looking into Mildred's concerned face across the aisle. I turned desperate blurred eyes towards the panorama below.

"You're not seasick?" Her voice came to me from afar off.

The plane gave another of those soaring jumps and came back with a crash. I gave up. I wasn't ashamed of it. One isn't ashamed of dying, and that was what I was doing. If the ship crashed then I'd have been glad of it . . . though I would rather have died on American soil. The beautiful scenery of Germany slipped by under our plane, but all I saw of it was the big rubber wheel outside the window and the bottom of the waxed paper bag in my hand.

After endless hours I felt a change in the soaring and crashing motion of the plane. It was spinning downward. I sat up with a start and looked down. The earth was rushing up to meet us. I felt that reassuring hand on my arm again and grinned greenly at Mildred across the way.

(*Continued on page* 60)

The First Chinese Aviatrix

Leah K. Hing who has set a new example for her countrywomen.

THIS photograph of Leah K. Hing, an American born Chinese girl, comes from Portland, Ore. She is 24 years old and will soon complete her course in aviation and receive her license. Tex Rankin, the famous instruction pilot, is her teacher. She will be the first Chinese aviatrix in the world.

Miss Hing hopes to be the "Miss Lindbergh" of her race. She has shown unusual ability and shows possibilities of becoming a stunt flyer.

Chinese Instructor

JAMES CHIN is the first Chinese to receive a pilot's license in Boston. He is now an instructor at the Canton Airport, China.

Chin, a Canadian by birth, left Boston after completing his training to enter the service of the Nationalist Government in his father's mother-country.

It is expected that instructors of this type will be of great assistance during disturbances with Japan.

Instructed in the United States, James Chin is now an instructor in the Chinese service.

Details of the American Cirrus Engine

by STUART E. KNUEPFER

So much interest has been displayed in this engine by our readers, that Mr. Knuepfer visited the Cirrus factory at Marysville, Mich., to get the intimate details of this well-known engine.

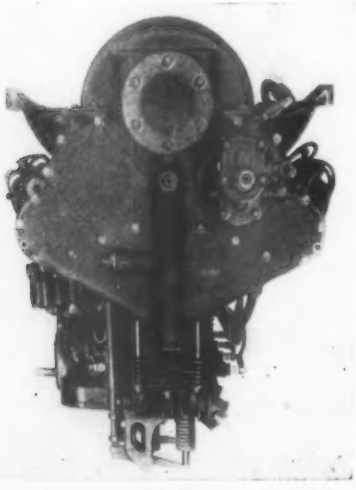
THE American Cirrus engine became popularly known through Lowell Bayles and his various exploits. It was with a super-charged Cirrus in a Gee-Bee plane that he first gained recognition as a speed artist.

The British engine, from which the present American Cirrus was developed, was brought to this country in the early part of 1929 after gaining much honor abroad. Improvements were gradually made by the American company.

Generally, we can describe the Cirrus as a four-cylinder 95 H. P. air-cooled in-line motor of which two types are manufactured—the "Inverted" and the "Upright". The greatest difference between these types exists in the fact that the former uses a dry sump oil system with its oil tank carried below the motor on the fire wall. The latter makes use of a wet sump system and carries all of the oil in the lower half of the crankcase.

In both engines, the heads are detachable from the cylinder barrels and this is one of the features which makes for easier and simplified overhaul whenever necessary. The entire cylinder barrel, with the removal of the head, can be lifted from the crankcase.

The crankcase is cast from a zinc-aluminum alloy while the cylinder barrels are of cast-iron. Valve seats are made of aluminum bronze with the cylinder heads of an aluminum alloy known as "Y" alloy. A special nickel steel is used for the valves, their springs being of the spiral coil type and secured by means of split collets and collars.



The Inverted model of the Cirrus engine with its carbureters and oiling system arranged for operation in the position shown.

The valve guides, which are a force fit in the heads, are of bronze alloy. It is interesting to note that bronze camshaft bearings are used instead of the usual babbitt lined type.

Gasoline is brought to the carbureter from either an overhead gasoline tank (by gravity) or by means of a gasoline pump if a fuselage tank is used. With the dual ignition system, the explosion of the mixture inside of the combustion chamber takes place when the piston, on its upward stroke, is between 40 and 35 degrees before top dead center. Two Scintilla magnetos are used, driven at crankshaft speed through the timing gears.

From a structural standpoint, the engine is anything but complicated. Valves are operated by overhead rocker arms which in turn are operated by means of push-rods in conjunction with tappet rods located in the upper part of the camshaft. In the cylinder heads, special bronze seatings for the exhaust and inlet valves are screwed and expanded into position. Timing gears are set in ball bearings, both in case and cover.

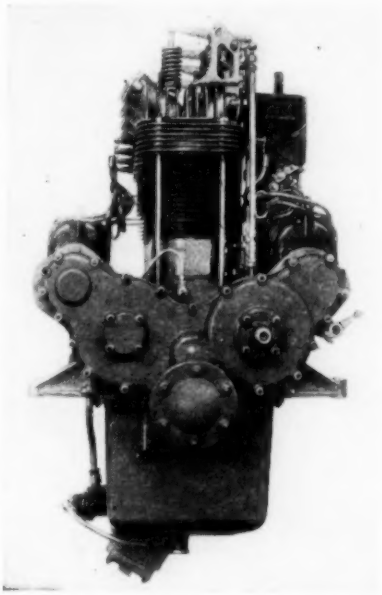
The crankshaft is supported by three babbitt lined bearings and two roller bearings. A thrust bearing in the nose takes the thrust from the propeller.

Pistons are of aluminum alloy castings, the crowns of which are reinforced on the underside by cross webs. Each is fitted with an especially hammered ring of cast iron. The lowest of these rings also acts as a scraper ring. A groove is turned in the piston immediately below it, and a number of small holes tangent and at right angles to bore are drilled around this groove through which oil can escape into the inside of the piston.

This arrangement prevents any excess of oil on the cylinder walls from finding its way into the combusion chamber. The hollow piston pin is of the full floating type, free to turn both in the housings of the piston and also in the small end of the connecting rod.

End play, beyond the maximum tolerance, is prevented by a spring clip at each end of the pin which is inserted into the housing and allowed to expand into an annular groove. Oil holes are drilled in the piston pin housings and also in the small end of the connecting rods through which oil, thrown up in the cylinder, can enter. This affords ample lubrication.

The four-throw crankshaft is of hollow construction with the complete



The Upright model of the American Cirrus engine, taken from the rear and showing the accessory drives. Note the twin magnetos and the oil pump at the bottom of the crankcase.

shaft rotating in five bearings. The caps for the roller bearings and center bearings are carried by the upper half of the crankcase and are secured by studs and nuts. The upper portion of the shaft is stiffened by three transverse webs, which also form the housings for the center bearings. Provision is made for securing the four engine bearers or supporting feet.

Housings for the ball bearings (carrying the timing gears) are provided by the upper half and timing gear cover. On the front wall, above the nose, a small casting is secured which acts as an oil filler and to which breather pipes are attached. The lower half forms in itself a cap for the radial thrust bearings. Upper and lower portions are bolted together, the joint being effected by a vellum gasket.

The camshaft is supported by four bearings, the rear being a large ball bearing and the remainder bronze alloy. The shaft is driven off the end of the crankshaft through the medium of steel gears supported, as noted above, between ball bearings housed in the top portion of the crankshaft and timing gear cover. Provision is made to couple a self-starter to the rear end of the crankshaft.

The induction manifold is of steel

(*Continued on page* 59)

Airline Hostesses Like Their Jobs

The duties of a hostess on board an airline transport are varied but pleasant.

THE newest vocation for women, that of air hostess, is now one year old. It was begun as an experiment but was declared today to occupy a permanent place in air transportation.

When Eastern Air Transport employed girls a year ago to fly as regular members of the crews of its big 18-passenger airliners, it told them that not only were they individually on probation but the hostess idea was on probation as well. It would have to prove itself.

Since that time, the seven flying hostesses have flown an average of 97,142 miles each, and have covered a total of approximately 680,000 miles. The three senior hostesses, according to terms of service, have covered more than 100,000 miles each in the year. And all of them declare today that in spite of their many flying miles they are "wild" about their jobs. Nearly 10,000 girls have applied for the job, the company stated.

"We are proud of our hostesses and the record they have made in this first year," said Mrs. Anne Porter Cullum, chief hostess. "Undoubtedly they have done more to convert women to air travel than anything else.

"People used to look upon air travel as hazardous, but these girls, flying their thousands of miles each month as regular routine, have demonstrated that flying is not dangerous on a conservative airline operated as a business and without frills. Since our hostesses went on duty a year ago we have developed several hundred regular passengers—people who fly regularly and often."

The senior flying hostesses are Miss Beulah Unruh, who flew 138,000 miles in the year; Miss Madeline Moon, who flew 118,800 miles, and Miss Marion Cook who traveled 108,600 miles. Miss Unruh is a pilot in her own right, holding a limited commercial license. She declares that she "likes all kinds of flying, whether I do the piloting or not."

According to the chief hostess, Mrs. Cullum, who is the daughter of an army colonel and rules over her department with military discipline, the typical flying hostess is a well-mannered well-educated and polite young woman who has traveled extensively in addition to flying. She is 5 feet 5 inches tall and weighs about 115 pounds.

Her duty is to greet passengers, see that they are made comfortable during the flight, distribute reading matter and cigarettes, serve light meals and refreshments aloft, supply information, answer questions and do a bit of aerial housekeeping by tidying up the planes.

Fuel Injection System for the Hornet Engine

FURTHER details regarding the Pratt & Whitney direct fuel injection system, announced recently as having been put into flight test service on a Hornet engine, are outlined here. This system, as previously announced, provide for the direct injection of atomized fuel into the cylinders and eliminates the necessity for a carburetor, pre-heaters, and hot spots.

In order to put the system into operation with the least possible change in basic design of the existing models, the carburetor and hot spot are replaced by an air valve which is bolted directly to the flange of the carburetor elbow on the rear crankcase section. This valve is for the purpose of controlling the amount of air entering the cylinders at all speeds. It is a simple butterfly type valve, provided with means for varying the amount of fuel and air for the purpose of leaning out the mixture at high altitudes. This valve is made of an aluminum casting and the necessary control levers are mounted directly on one side of it.

The fuel injection pumps are contained in a special crankcase front section casting, which replaces the standard front section. They are arranged radially just forward of the usual valve tappets. The pump actuating mechanism consists of a special four-lobe cam which is carried on the forward face of the cylinder valve operating cam, the latter being similar in design to the standard valve op-

(*Continued on page* 63)

A New Altimeter

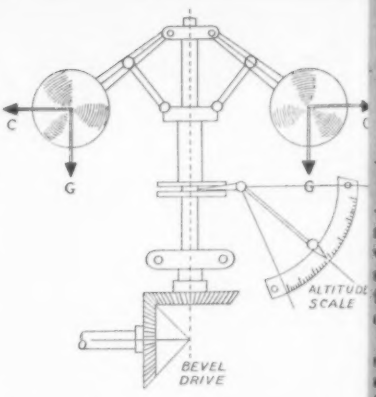


Diagram of centrifugal type altimeter that shows the distance above the ground level

FROM Australia comes news of a recent altimeter for airplanes that is quite radical in operation.

Instead of the usual barometric type of instrument, this device depends on gravity. As can be seen from the simplified drawing, the instrument consists of a small, constant-speed motor a shaft with two arms, similar to the well known centripetal governor, and a recording dial and needle controlled by the governor.

The action is quite simple. The small motor revolves the shaft at a constant r.p.m. A constant centripetal force produced by this constant r.p.m. swings the balls of the governor to a constant distance from the shaft. Another force is acting on the balls, namely gravity. The force of gravity varies inversely the distance from the center of the earth. The force of gravity tends to pull the balls of the governor down.

Since the centripetal force on the balls is constant, the only variable force is gravity. It is well known to what degree this force varies with different altitudes, so it is possible to adjust a dial and needle to register the change of force of gravity, and as a direct result, the change in altitude.

This instrument is a great improvement over the old forms of altimeters in that it does not depend on a force that varies for a given altitude. So far as known, the force of gravity is constant (within a very minute error) for any given height. In other words —this instrument will register the exact height under all weather conditions. Further details on this excellent instrument will be published as soon as available.

Airports Increase

DESPITE a slowing up of building over the country generally, a total of 171 commercial and 107 municipal airports are recorded by the Department of Commerce as having been added to the airport map in 1931.

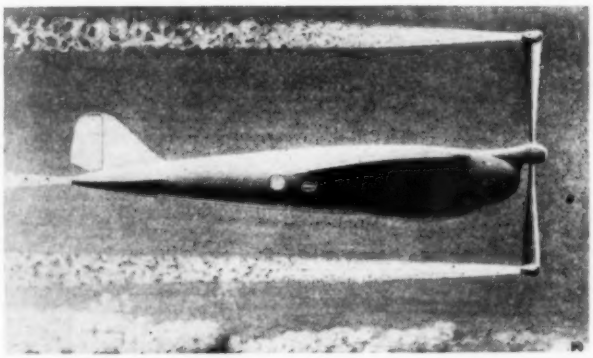
Latest Rocket Planes for the Stratosphere

by NOEL DEISCH

A combination rocket and propeller system is suggested for meeting the problems connected with flight in the highly rarified stratosphere.

MANY aeronautical engineers feel very sure that when the stratospheric plane comes it will be driven in its long arc from continent to continent by a reaction-motor or rocket.

The reason, as pointed out with due mathematical argument, is that in air of the density that exists at a height, say of 50 or 100 miles, and at the speeds at which it is hoped that a stratospheric plane in its ultimate development will travel, about 600 m.p.h., a rocket will be both more efficient and more practical than the conventional engine-driven screw propeller.



A sketch of the proposed ship provided with a specially designed propeller and jet system for operation in variable strata.

However, every stratospheric plane must, through an important portion of its flight, progress under conditions very different from those that obtain when it is, so to speak, in its own proper element. It must begin by making what would at present be thought of as a stupendous altitude flight before getting fairly into the main span of its journey.

During the first stages of this climbing flight, when its speed is comparatively low and the atmosphere is dense, the efficiency of a machine propelled by direct rocket action must inevitably be very low indeed. During this period then, propulsion by conventional screw-propellers is vastly to be preferred over rocket propulsion.

On the other hand, we are reluctant to conceive of a craft as being encumbered during the whole of its journey by a heavy engine which is called into requisition during only a brief portion of its flight.

Doctor Goddard, of rocket fame, not long ago suggested a solution to the difficulty just indicated in which the virtues of the propeller and the rocket are combined into a single structure. The rocket burns continuously, not only during the high altitude portion of the plane's flight, but from the moment it takes off.

However, in the earliest stages of flight, the discharge from the rocket does not drive the plane directly by its own reaction, or at least only secondarily so, but rather it is used to turn a pair of ordinary screw propellers which themselves act on the air to impel the plane forward.

These propellers are fitted with circular rims containing turbine blades which dip into the rocket jet and transfer energy from the jet to the propeller proper. In other words, the air-propeller is closely associated with a gas turbine rotor. When the higher regions of the stratosphere are attained, the propellers with their turbine rims are moved by means of an adjustable bracket away from the jet, and the plane continues its flight as a simple rocket-driven airplane.

Thus, by Doctor Goddard's ingenious suggestion the special virtues of the propeller and of the reaction motor are each retained, whereas, the necessity of providing an engine of the usual type is obviated, that much weight being saved for pay-load and fuel. However, the mechanical embodiment of his idea does not appeal to some aeronautical men as being wholly air-ship-shape.

COSMIC RAYS
IN UPPER AIR SUN and STARS SEEM TO SHINE in a BLACK sky
FIERCE CONTINUOUS EAST WIND causes BALLOON to DRIFT
SECOND AIR LAYER -135° BELOW ZERO
GONDOLA BUILT LIKE DIVING BELL, HERMETICALLY SEALED, equipped with PARACHUTES and BREATHING APPARATUS. IT WILL CARRY TWO MEN 6 MILES UP!
OBSERVERS WINDOWS
FIRST AIR LAYER TWO MILES DEEP A REGION of STORMS and VARYING TEMPERATURES
FAST PLANES and AUTOS WILL FOLLOW DRIFTING BALLOON
SAVAGE

Diagram showing the relative position of the stratosphere, and the stratospheric balloon of Prof. Picard.

The ring of turbine blades is necessarily quite heavy, since the peripheral speed is very great, calling for a substantial construction to withstand the tangential stresses generated.

To reduce this weight, the propellers must be kept to a diameter which does not speak for good aerodynamic efficiency. Then, the rims and shiftable supporting apparatus are such as to offer greater air resistance than is desirable in a craft designed for the highest attainable speeds.

LET us consider another application of Doctor Goddard's principle which allows of the use of a plane of more nearly conventional design.

In this case again the propeller is jet-driven, but the driving turbine is of a pure reaction rather than of the impulse-reaction type. We have a single propeller located out at the forward end of the fuselage as in usual practice. At the top of each propeller blade is a jet-propulsor, fed by liquid fuel which is carried down the length of the blades in pressure tubing. The jet from the propulsor escapes tangentially and produces a moment which rotates the propeller on its axis much after the manner of a pin-wheel.

At the high peripheral speeds attained in an air-propeller, the rocket motor would act with an efficiency approaching, though hardly attaining, that of the usual gasoline engine. In the present arrangement, moreover, the propeller is of the adjustable-pitch type:—in fact each blade can be adjusted from the minimum or take-off pitch to a pitch of substantially 90 degrees.

(*Continued on page* 55)

Hollow Propeller Aids with Exhaust

ARMY Air Corps engineers, stationed at Wright Field, Dayton, Ohio, have designed a hollow, all-steel, propeller which connects to the airplane engine's exhaust. The new propeller is of light weight, durable, rigid, and sheds ice more easily than any other type.

The horsepower of the engine may be increased by connecting the blade to the exhaust. The rotation of the blade creates a vacuum, which draws out the exhaust gases. The gases, in turn, warm the propeller and tend to keep ice from forming.

Bicycle Glider

HANS RICHTER, a German living in Berlin, has made a glider-bicycle with 20 foot wingspan and 6-foot chord with about 5 degrees of decalage. By pedaling, he is able to create a lift of about 30 oz. per square foot, and make short glides by means of the wings.

X-Rays Reveal Defects

AIRPLANES, like human beings, frequently suffer from injuries concealed beneath their "skin." Hence the use of the X-ray for revealing such defects is just as logical with airplanes as with human patients.

In the accompanying photograph, one of the staff of the Curtiss-Wright organization is shown examining the internal members of a fuselage. The apparatus consists of an X-ray apparatus and fluoroscope, having a high power tube with a high degree of concentration that will instantly reveal any cracks, breakage or other defects. This equipment is mounted on rollers so that it can easily be moved about.

Examining the condition of an injured fuselage.

Celebrating the Fourth

(See Cover)

A MADLY gyrating plane keeps the crowd spellbound with the daring of its pilot. It swoops down with dizzying speed and performs a tight loop so close to the ground that its tail nearly brushes the cinders off the runway—uselessly daring and dangerous, perhaps, but this is the Fourth of July—and what's the odds?

Attached to the two wing tips and the fuselage are smoke bombs emitting red, white and blue streamers of smoke that fantastically trace out the path of the plane—like the smoke wreaths left by a sky-writer. Something new, perhaps—and perhaps not, for exhibition flying fashions advance rapidly.

But anyway, the stunt is a thriller and should satisfy the most exacting and hardened of stunt fans.

A FEW OF THE FEATURES SCHEDULED FOR THE AUGUST ISSUE OF "P. A."

1. *Medal Men of the World War.*
2. *What Aviators Think of Aviation.*
3. *Recent Developments in Britain's Air Force.*
4. *Are Man's Muscles Meant for Flight?*
5. *France Produces a Tailless Ship.*
6. *Answers to Official Transport Pilot's Exam.*
7. *What Makes the Autogiro Fly?*
8. *Training with One Foot on the Ground.*
9. *Scale Flying Model of Great Lakes Trainer.*
10. *Radio Code Practice Set.*
11. *An Electric Soldering Iron.*
12. *Snap-Shot Projector.*
13. *Making an Archery Set.*
14. *Shop Kinks and Recipes.*

Old Style 'Chute Saves Life

TRYING to make his first jump in a high-compression silken life-saver, a California aviator nearly lost his life recently. The jumper went aloft in an open biplane with another pilot, the new 'chute being tied to the lower wing of the plane. The jumper then attached two strands of cotton rope from the center supporting ring to his body.

When he was 3,000 feet up, he climbed out on the wing and jumped. The new 'chute opened but the strain evidently was too great for the connecting ropes, for they snapped, and allowed him to fall. When he had fallen about half way to the ground, he found the ring on his safety 'chute which he had taken the precaution to take with him. It opened up and checked his fall. He made a safe landing.

New Test for Propellers

Using the dip test for propellers.

THIS recent test for used airplane propellers, to determine their condition, is very interesting.

The blade, having been removed from the hub, is first dipped in a caustic soda bath. After being removed, it is thoroughly washed and then bathed in nitric acid. After it is carefully washed and dried, the blade is placed under a microscope and examined for possible fatigue failure.

Claims for this test indicate that it may be the test for which aviators have been hunting. So far, no means of testing and examining propellers has been thoroughly satisfactory.

The importance of a reliable means of examining propellers is quite obvious to everyone interested in aviation. A hidden flaw easily increases under the centripetal force developed in a revolving propeller, causing it to break. An inexperienced pilot, or no landing field spells "finis" for him and any passengers he may have.

The present method of safeguarding against a propeller breaking in the air, due to some internal or hidden injury is rather expensive. They are changed at frequent intervals.

The practice, however, has a very dangerous reaction. The used propellers are sold to unsuspecting buyers (sometimes as new material). Needless to say, the buyers' lives are greatly imperiled by this practice.

Brazil Rules Out U. S. Pilots

THE country of Brazil, to cope with the problem of unemployment in the aviation industry, has ruled that all planes registered by the Brazilian government, and in use in that country, must be piloted by Brazilian aviators. This will affect several U. S. commercial lines.

XUM

The Photo Fans Club

WHEN we started this column, we had no real idea of the great number of readers who were interested in collecting airplane photos. We have had many names submitted to us for entry in our directory and have been informed of many interesting and favorable picture trades that have been made by the members of this club.

At this point we wish to announce that we will sell certain of the photographs that have been reproduced in this issue and past issues of POPULAR AVIATION. Some of the really valuable pictures we will retain for our own files, but there are many others that we will dispose of at $1.00 per picture. These are real photographs—originals and not copies nor half-tone engravings. Write in your order, giving us the date of the issue, the page and the title of the caption appearing under the picture in question.

And now to the work of listing new members to the club and their requests.

Filo H. Quinby, 301 W. Gonzalez Ave., Pensacola, Fla., is specializing in the collection of racing and fast pursuit type ship photos. He, by the way, is the first to purchase a photo from P. A. under the new offer.

George Meck, 5440 Osage Ave., Philadelphia, Pa. would like to purchase 8" x 10" photos to enlarge his collection. He is collecting all types, either warplanes or modern ships, and he says in his letter that he can tell any of our readers where to get photos of any American ship and their cost.

Andrew Borysko, 1485 E. 96th St., Brooklyn, N. Y., says that he is willing to trade or buy airplane photos near the 116 size—either commercial or military ships. He should be able to satisfy this ambition after corresponding with other members of our club.

Edgar Kestler, Spencer, N. C., is interested in photos of all sorts of planes, commercial or military. He will buy the pictures from our readers, and would like to get prompt action.

Margaret C. Morrison, general delivery, Casper, Wyo., writes a mighty interesting letter in which she states that she is a student flyer of three months standing. She is interested in all sorts of aircraft pictures and will purchase them as she has none for exchange.

Lee Enich, 3426 Randolph St., Drexel Hill, Pa., is hereby installed as a member. He has no photos to trade, but will tell other members where to get war type photos if they will drop him a line.

Jack Kleinberg, 1302 Avenue "K," Brooklyn, N. Y., wishes to get a wartime photograph of a Spad 11. Who will oblige him?

Eugene Rutledge, 729 College Hill, Oxford, Ala., has some photos of the Pitcairn Autogiro and the Ford Trimotor ship that he would like to trade for pictures of army and navy planes. He is also interested in snapshots of pilots and parachute jumpers.

Question and Answer Department

All questions of general interest on any phase of aviation will be answered authoritatively by POPULAR AVIATION'S Technical Staff.

THIS department is at the service of our readers and we are ready to answer any question on the subject of aviation that they may wish to present. This service, of course, is rendered without charge.

However, it is obvious that such questions must be of such a nature that they will be of interest to our other readers and not of a purely personal character. Further, we beg to be excused from giving advice on inventions and patents, for this matter can only be handled by a competent patent attorney.

Address your queries to the Question and Answer Department, POPULAR AVIATION, 608 S. Dearborn St., Chicago, Ill. Write distinctly, giving your full name and address.

* * *

QUESTION:—A. C. Brinker, Ottawa, Ill. *What is the "standard pitch" of a propeller? Is this the distance traveled through the air for each revolution?*

ANSWER:—THE standard pitch is the geometrical (measured pitch on propeller) taken at a point located two-thirds the radius from the center. The geometrical pitch is the actual pitch of the blade, the distance that the prop would travel if it were working in a solid material. This pitch, of course, is greater than the distance advanced through the air per revolution, since the blades "slip" in the air.

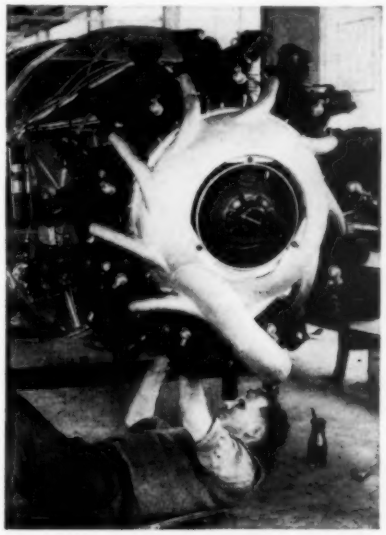
* * *

QUESTION:—George B. Cooke, Boston, Mass. *Which is the most effective, the upturned aileron or the flap that is turned down? I do not believe that the righting forces can be equal on both ends of the wings for the airstream hits the convex back of one flap and the concave face of the other.*

ANSWER:—THE upturned aileron is the most effective of the two flaps, and further, this upturned flap creates less drag than the others. It seems to dam back the air over the top of the wing and thus destroys the partial vacuum over the top surface, reducing the lift on the high side very effectively.

* * *

QUESTION:—Fred D. Hunt, Appleton, Wis. *What loads are included in the term "Useful load" and how does this differ from the "net weight"? I have seen both terms used.*



This view of a radial airplane engine shows the exceeding large carbureter necessary for flight.

ANSWER:—THE net weight is the total or gross weight minus some specified partial weight. Very frequently, this partial weight is the weight of the wings or it may be the useful load. The useful load is the weight of the crew, passengers, fuel, lubricating oil and the cargo.

* * *

QUESTION:—James E. Lewis, Spokane, Wash. *What are the "drag wires" in an airplane and why are they used? Is this part of the bracing or are the wires used for some other purpose?*

ANSWER:—THE drag wires, as the name indicates, take up the wing stresses due to the drag of the wings. If it were not for the bracing wires, the wind stream would sweep the wing tips backwards. These wires are placed between the top and bottom surfaces of the wings, and generally, are arranged diagonally between the front and rear spars.

(Continued on page 54)

In ships of this type (Ford Tri-motor) the drag stresses are usually taken up by the outer metal covering or skin, instead of by the more common internal bracing.

The New 160 H. P. Kinner Engine

A RECENT addition to the line of aircraft engines now being manufactured by the Kinner Airplane & Motor Corporation, Ltd., is a new 160-horsepower engine, known as Model R-5. This engine successfully passed the United States Department of Commerce Test and was granted Approved Type Certificate No. 77 with an official rating of 160 horsepower at 1975 r.p.m. This new model Kinner engine weighing but 305 lbs. is the lightest aircraft engine in its power class manufactured in the United States, and is designed to fill a definite need on the part of aircraft manufacturers. Owing to the many advantages of the five-cylinder radial air cooled engine, the Kinner Company has also developed this new model with the same number of cylinders.

The R-5 adheres to the characteristic Kinner design in employing a separate camshaft for each of the five cylinders, making possible a most efficient accessory drive arrangement. Spur type magneto drive gears are driven by the cam gears. Oil pressure and scavenger pumps are driven by shafts keyed into slots in the ends of numbers three and four camshafts respectively.

Special aluminum alloy cylinder heads are secured to forged steel cylinder barrels by 16 studs each and are removable, thus providing for economical replacement of either part separately. There are two overhead valves per cylinder actuated by a valve mechanism completely enclosed with grease tight rocker arm boxes and push rod enclosures.

Aeronautical · Oddities by Marinac-

MARTIN JENSEN-FORMER ENDURANCE PILOT," FLEW HIS PLANE ONE MILE BACKWARDS WHILE UPSIDE DOWN!
"AL" WILSON. NOTED STUNT FLIER. WAS BADLY INJURED WHEN HE FELL OUT OF BED!
AMELIA EARHART, THE FIRST WOMAN TO FLY THE ATLANTIC, BROKE THREE WORLD SPEED RECORDS FOR WOMEN IN ONE DAY!
THE FASTEST BUILT AMERICAN SPEED-PLANE, NEVER FLEW!

Life Saving by Plane

A THRILLING tale is told in the log of the Department of Commerce airways radio station at Winslow, Ariz., in connection with the dropping of food by army bombing planes to the Navajo Indian tribes marooned by heavy snows and in danger of starving to death high up in the mountains, where the Indians were harvesting their annual crop of pinon nuts.

During the time the bombers were in the air the Winslow station acted as their only connecting link with the outside world, protecting the bombing crews in case of forced landing and permitting a co-ordination of the whole rescue program.

The first entries on the log concerned the advance of the planes from March Field, California, on Winslow. The log traces the progress of the planes as they contacted the airways radio station en route and finally recorded the safe arrival of all ships.

The log for the next day tells in terse form the story of the splendid flights, in the face of severe handicaps, to the Indian camps where supplies were dropped.

During the two days that followed, constant check was made on the movements of the planes and three of the log entries show the value of the constant radio contact:

"10:24 A.M.—Bombing plane B-8 turning back, evidently motor trouble."

"11 A.M.—No. 8 still unheard from."

"11:30 A.M.—Bomber No. 8 landed Winslow O.K. Other planes advised."

The Department of Commerce bulletin reporting the incident says:

"The squadron of bombers was on a difficult assignment. It was operating over sparsely settled territory at a time when snow covered the ground and a slight mishap might have had serious results because of weather conditions. However, by using the radio station, the various craft, scattered over a wide area by their individual assignments, were able to be in constant communication with Winslow."

Licensed Pilots Increase

A SURVEY, recently completed by the Aeronautics Branch of the Department of Commerce, shows a steady growth during the last six months in the number of aircraft and pilot licenses—but the number of licensed mechanics has decreased.

The United States now has 17,739 licensed airplane pilots, 7,553 licensed aircraft and 9,016 licensed airplane mechanics. There are 10,780 aircraft in the country, exclusive of military fighting planes, but a third of this number are unlicensed planes, most of them privately owned.

532 women have received pilot's licenses. Of this number 433 are private, 56 limited commercial, 42 are in the transport grade and only one industrial. The survey lists five licensed woman mechanics.

XUM

Conveniences of Modern Air Travel

by GERTRUDE THORNHILL

Real service is rendered by the airlines of today. The passenger now travels more rapidly and also more comfortably than at any other time in the past. The old problems of passenger accommodation have been largely overcome.

The Administration Building of Floyd Bennett Field, Barren Island, N. Y., is just one example of the elaborate buildings and the equipment found at modern airports.

AVIATION'S, "Do-You-Remember-When" Club, is no longer exclusive. Formerly, it was composed only of old-time pilots who recalled the days of the Jenny and the Standard. Today, it includes the whole army of pilots, students, flying field personnel and visitors who knew the flying game only a few months ago, before it put on "company manners".

All but the newest of comers can now hark back to "old times" when an entirely different atmosphere surrounded the flying field—when something of the old glamor of the early days still lingered and their breezy easy-going ways were not yet a thing of the past.

Time was when pilots and field men sat in the office and swapped yarns about the old flying circus days, when students played football on one end of the field between flying lessons and when the occasional passenger looked pretty much after himself when it came to tickets, baggage, and other details of travel.

It was not indifference to the public—this absence of formality and system. Aviators have long been eager for the promotion and development of aviation. It was rather a feeling of camaraderie born of common experiences; a friendly informality fostered through the nomadic days of barnstorming; a debonair careless-of-tomorrow attitude developed by pioneering pilots in the days when commercial aviation as a profitable industry was a far gleam.

And then big business—accustomed less to dreams than action—with its pronounced ideas about efficiency and service invaded the flying field. Aviation is no longer a "game"; it is an industry. And everywhere—in ports and ships and personnel—the change is reflected. For some, there may linger just a shade of regret for the departed free-masonry of the earlier days, but most of the field employes are too busy to waste their breath in sighs.

Pilots off duty still linger around the fields—for there is still a love of flying in their hearts that lures them out to the ports—but they have their own club room. The offices are dedicated to business. Students in many cases have their own fields and find classes in theory of flight more profitable than ball games. And the passenger—here it is that the greatest change of all is perceptible.

AT the ports today, everything is arranged with a view to serving the passenger. Whereas he formerly wandered about the field buildings looking for a chair, today there are luxurious waiting rooms provided for him. Magazines, books and soft-upholstered chairs invite him to rest. If he has business to transact, there are telephone and telegraph facilities and writing equipment at his command. If he is hungry, there is a cafe and often a soda fountain to serve him.

Most remarkable of all is the system that has been worked out to make air travel convenient and the precision with which it operates. At practically all leading hotels, the traveler need but speak to the porter and forget the matter. The porter calls the airport office, arranges for the reservation, and presents the passenger with an order for a ticket. The passenger is called for, either in the air transport company's own car or in a taxi specially arranged for by the company.

Arriving at the field he is greeted by a uniformed attendant, who takes his baggage and directs him to a waiting room or a plane. Most pilots are also nattily uniformed, suggesting to the passenger the skill, sound judgment and sense of responsibility that have long been associated with the uniform of the captain of a sea-going ship.

A steward attends to the ticket and the checking of the baggage—for baggage is now handled in a systematic manner rather than in the old way by which each passenger fumbled over the stack to identify his own bags.

The plane is taxied to the front of the administration building and passengers reach the plane through roped-off lanes that eliminate the old danger of the whirling propeller. Inside the plane, the passenger again observes a transformation. Whereas he formerly expected nothing but a seat, planes have now been equipped to afford him every comfort of de luxe rail travel.

Seats are comfortably upholstered, covered with fresh jackets, and provided with additional cushions. In a pocket of the chair, passengers find chewing gum, schedules, and, in some planes, a picture of their pilot with a sketch of his flying career.

Cabins are also equipped with newspapers, magazines, smoking equipment, ice water and lavatory. Formerly, when the passanger grew hungry, he remained so or perhaps accepted a sandwich from the lunch-kit of a friendly pilot. Today, many lines serve lunches in the planes and others make arrangements for a stop for lunch where the traveler dines in a modern cafe.

Famed "Greasy Spoons"—which in the vernacular of the flying field meant a small none-too-well equipped lunch room—of the earlier fields are decadent. In some cases, orders are telephoned by long distance so that no delay will be experienced in service.

AIR transport companies continue to add extra comforts for their passengers. The Southern Air Trans-

port division of the American Airways, Inc., operating passenger lines over the South, has made an innovation that may suggest much to other companies. Passengers over that system are no longer reduced to speculation concerning the identity of towns or rivers below. They merely don their headphones and listen to the co-pilot's description of the route.

Radio sets have been developed by that company to permit the pilot to communicate with the passengers, relating to them interesting accounts, descriptions and bits of legend regarding the country over which they fly. Strip maps are also furnished the passengers as they enplane, which help them to identify details of the landscape below.

Radio sets are also useful in communicating to the passengers information about the flight, such as altitude or speed. Passengers are invariably curious, transport operators have found, about their altitude and some have installed altimeters in the passenger cabins.

Almost coincident with this change in the industry has come a change in the public utilizing its services. Part of the altered situation may no doubt be traced to a general reduction in fares that has made the advantages of air travel available to the citizen of the average pocketbook. A considerable share in the changed attitude of the public may be attributed to the altered methods in the industry.

An Air-Minded Baby

THIS little 16-month-old girl has spent as many hours in the air as most babies of the same age have spent in their cribs. She is Joyce Hartung.

Her father, Howard Hartung, is a well-known instructor and her mother is a licensed pilot. Not only that, but they were married in an airplane. No wonder the baby takes to the air.

Baby Joyce with her specially designed parachute pack.

Cleaning Helium Gas for the "Akron"

A portable helium compressing plant used for emergency service. It is fitted with living quarters for the crew.

TWO of the largest high pressure helium compressors ever built have been delivered recently to the Bureau of Aeronautics, U. S. Naval Department. One of the compressors will be mounted on a permanent foundation at the Naval Air Station at Lakehurst, N. J., and the other, a portable unit, mounted on a specially designed freight car, was sent to Akron, Ohio.

The compressors have the power to reduce the volume of extremely attenuated helium gas to such an extent that there is a resulting pressure of 2,500 pounds per square inch, equivalent to about 170 ordinary atmospheres, or more than 12 times the ordinary steam pressure of a locomotive. The compressors are four-stage compression type and when operating at 2,500 pounds pressure deliver 15,139 cubic feet of helium an hour. When operating at 750 pounds pressure, it will deliver 20,160 cubic feet of gas per hour.

The compressors are driven by 200 h.p. motors with a speed of 720 r.p.m., the drive consisting of 15-V belts. A change in the compressor speed is obtained by the use of two different diameter pulleys on the motor shaft. Special arrangement is provided for quick change of pulleys.

The mobile unit may be used at various helium serving stations, including the principal one at Amarillo, Tex. The machine in the car is designed so as to be removable as a unit in case of necessity.

In case of emergency in the operation of the Los Angeles and the Akron, great navy dirigibles, the mobile unit can be rushed to the nearest point and the unit removed from the car to the dirigible to salvage the gas.

The Akron has 12 gas bags containing 12,000,000 cubic feet of helium (or about $420,000 worth). This country is the only one in the world with an appreciable supply of helium. Helium, of course has all the advantages of hydrogen without the extreme danger of burning.

The mobile unit has a separate compartment which is fitted up as living quarters for the crew.

The Day for Daredevil Pilots is Over

THE daredevil pilot will soon be as legendary as the pirate of the Spanish Main, and his successor will be commonplace as a train conductor. Writers of adventure stories, feminine hero worshippers, and small boys will have to seek new idols.

"The uniforms they are putting on us are symbols of the change which is coming," said an old (7,000 hour) pilot. "I can no longer saunter into the cockpit, clad in a pair of faded coveralls and a stiff straw hat. One line already has its pilots in uniform looking like glorified chauffeurs, and other lines are considering the same policy."

The pilot who spoke was ferrying a plane alone last New Year's day. The plane iced up. He had to bring it down quickly in wild forest country. He involuntarily wrapped one wing around a tall fir, pulling it up by the roots; otherwise he landed in perfect form, and stepped out, unhurt. A photograph of the plane, and the tall trees crowding in around it, showed the incredible skill of the pilot's landing.

"It was dark and the snow was three feet deep, nothing to do, so I climbed into the cabin and went to sleep."

In the morning, this pilot, who, by the way, is only five feet four inches tall, walked out through the three feet of snow, found cougar tracks, followed

(*Continued on page* 52)

The Life Story of Eddie Rickenbacker

by FRAZIER HUNT*

How Eddie Rickenbacker, one of America's greatest aces, battled his way up from obscurity to become a national hero.

THIS is the story of a tough little kid who suddenly had a great change of heart and decided he was going to amount to something. He was the bad boy of his neighborhood, the gang leader; he had an uncontrollable temper and a wild streak of petty meanness.

All this was twenty-nine years ago, in a rather small but comfortable home in Columbus, Ohio. In the front parlor lay the body of a sturdy German-Swiss emigrant. The tough little boy was twelve years old—the man lying in the casket was his father; there was one older brother and one older sister, and four younger children. And just as they were starting out to the church for the final services, the mother called them all together into the front room.

"I want you all to promise me something," she said. "I want you to promise me that no matter what happens you will always help one another."

The tough little boy swallowed a lump in his throat. There were tears in his eyes. He took his mother's hand clumsily: "Don't you worry," he gulped, "I'll take care of everything—don't worry."

The next morning, when the other children started off to school, he walked part of the way with them and then he turned off to the factories of the city. At the glass works, he lied; he told them he was fourteen; and they gave him a job at $3.50 a week.

There was no time nor thought now for his "gang" and their minor depredations. He was the head of his family—he was taking his father's place.

When he was thirteen, he figured that there wasn't much chance to get ahead in the glass works, but he thought he could get a job at better pay in a foundry; so at three o'clock one morning he left his work, walked over to a foundry, found a good job at $1.00 a day.

Long ago, he had made up his mind to amount to something—but just what, he couldn't figure out—and now he got to thinking about being an artist, so in the evenings he went to a night school and took lessons in drawing. And then, he got a job in a monument works. This was sort of being an artist. With his own mallet and chisel he carved out the simple epitaph on his father's stone. For two or three years, he worked here as a stone-cutter.

This was along in 1907 when the motor car had just come into its own. There was something to dream about—speed—travel—machinery — something that you could create and then build with your hands! Right here in Columbus was the Frayer-Miller Auto Company—he'd get a job there and learn the business. He was sure now what he wanted to be—he wanted to be an engineer. Well, the only way a poor boy could get an engineering education that he knew anything about, was to take a correspondence course; so he did.

Eddie Rickenbacker just after receiving one of his many decorations.

On Sundays, he would go over to the Frayer-Miller factory and talk to Lee Frayer. Lee Frayer was starting to drive racing cars about this time. Finally one Sunday, Eddie told him he thought he'd come to work for him the next day, and when Lee said he didn't have any job for him, Eddie said, "That's all right, I'll just try it out anyway without any job." And that next morning, this slender, seventeen-year-old boy was the first one in the factory and when Lee Frayer came in, he found Eddie sweeping out the offices and the draughting rooms.

A day or two later, Frayer gave up and put the boy in the engineering department. A few months later, he made him his own personal mechanic and racing assistant. And in 1903 the two came east and raced in the Vanderbilt Cup.

Now, the ex-bad boy was sure he knew what he wanted to do—he wanted to be a motor engineer and to build cars to race in; he was going to be a champion, too. He'd have to give up smoking; he'd absolutely have to control this wild temper of his. He'd not take a drink and he'd learn to "take it on the nose" — to smile at victory and defeat. He'd have to develop, conscientiously and stubbornly, a definite personality.

He did all these things. By the time he was twenty-five he was one of the great racing drivers of the world—one of the most popular champions who ever lived. He became famous for his smile — his ready acceptance of defeat—his gallant sportsmanship and his dare-devil driving. But, as he explained to me, it only looked like dare-devil driving. As a matter of fact, he was cool, cold-blooded, calculating; he knew exactly the chances he took and why he took them. He was spectacular, but not fool-hardy. He had learned to be a great showman.

In the early days of 1917, he was called to England to build and captain a team of Sunbeam racing cars; and two major things happened there. First, he saw that the winds of hate and stupidity would soon blow America on to the rocks of war—and that for him, aviation was a beckoning, flaming goal—and almost on the day when he had decided to enlist in the British Royal Flying Corps, diplomatic relations were broken off with Germany. He hurried home.

Back here he saw his chance for the best training in aeroplanes and for early action was to get to France; but the question was, how? Struggling with the answer, he started preparing for his final five hundred mile race in Cincinnati, and then, on an early May day in 1917, a telephone call came from a member of the General Staff in Washington—would he like to go to France with an early unit in the motor section? "Give me until tomorrow morning to think it over," he replied. The next morning he called up and said he would be ready to go in ten days. "You'll have to report tomorrow morning at Governors Island in New York, if you want to go," the answer came back. "I'll be there," Eddie replied. The next morning he reported at Governors Island.

He was made a sergeant—and the following morning boarded the ship with General Pershing and his staff for France—for war—for the bright face of danger—for a romantic and magnificent burst of courage and skill that was soon to write his name at the very top of the list of America's

* *World famous interviewer. This article contains excerpts from a radio talk made by Mr. Hunt under the auspices of the New York Life Insurance Co.*

XUM

war heroes! He had but one thought —to get into the air service as quickly as he possibly could, and then to get to the front and into the fighting! But up to now he was only a chauffeur—even if his immediate boss was General Pershing.

For the first few weeks in France he drove the commander-in-chief. But he didn't rest until he was transferred to Colonel Billy Mitchell — who happened to be head of the American aviation. In seventeen days he had completed the whole course of training. Now he was a lieutenant and transferred to Issodon as engineering officer. It was a real struggle to get out of this job, where he fitted like a glove; but he finally wangled his way to the French gunnery school. And on March 4, 1918, he got himself sent to the 94th Squadron—this was the All-American squadron commanded by the brilliant Major Raoul Lufbery, once a member of the famous Lafayette Escadrille, with a record of seventeen German planes to his credit. All too soon Lufbery himself was to die in the clouds. Two days after joining his squadron Eddie took his first flight over the German lines and on May 3, 1918, he brought down in flames his first enemy plane. Six months later, to a day, he shot down his twenty-sixth German plane. He was now America's ace of aces.

What a great fighter he was! What an "esprit" he put into his great "Hat-in-the-Ring" Squadron! You ask any doughboy in France about Eddie and his famous "Hat-in-the-Ring" boys!

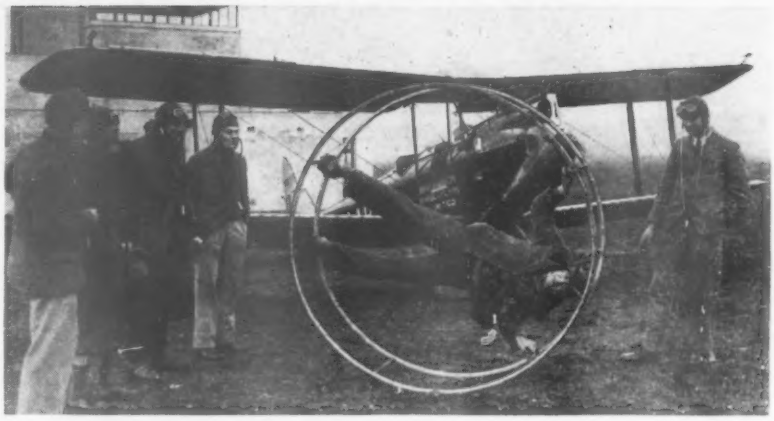
I shall never forget a November morning near Exemont, and a duel in the air, which I myself saw, and the German plane that crashed down out of the sky in flames! "I bet that's Eddie Rickenbacker that shot him down," a doughboy runner with me said. It was Eddie—Eddie the magnificent—Eddie with the heart and nerves of steel!

That warm, friendly, sporting smile on his face was hard and set those days. "It was pretty awful," he said to me the other day—"you see, I had to learn to hate—I had to learn to kill—and here for years, I had been teaching myself to be a 'good fellow,' not to care whether I won or lost, and now I had to change all that! I had to learn to be cold and hard, and to kill those decent German kids; you know, shoot 'em down while you were looking at 'em. And the greatest battle of my life has been to get over that—to quit being hard and to stop hating. That's been a real fight!"

But Eddie won, just as he has won in most everything he has tried. With the war over and back in America, he returned to his beloved motors. There have been ups and downs—he has made and lost two or three comfortable fortunes, and now he is "in the air" again —an executive in a great aviation company. And his real future still lies before him—not behind him.

END

Some Strenuous Training Methods



Pilot taking his daily dozen on the gyro wheel—a late English development.

AFTER aviation training—then what? Why, then comes the long ordeal of keeping fit for the job by various methods. This is what certain English officials believe who have introduced gymnastics into the game of flying.

In the accompanying photograph, taken at Brooklands, England, a pilot is shown taking his daily dozen with a "gyro wheel." It is believed that such exercises are exceedingly useful, both before and after training in acrobatic flying. It keeps the mind and sense of balance in trim for looping, spinning and other maneuvers.

Reader Designs Ideal Flivver Plane

by JOHN L. ARMSTRONG

HEAR ye! Hear ye! Hear ye! Ye public is waiting for the flivver airplane!

For quite some time we've been hearing about planes that were going to become as popular as Henry Ford's well-known gift to the people. But for some reason or other most of us are still stepping on the accelerator and rolling over the road instead of pushing the throttle lever and tearing through the ozone.

Something must be done!

Something has been done!

Behold—the JOHN PUBLIC!

Right here you behold a drawing of the plane that bears the name of that famous person. It is the plane in which all of us should be daily zipping along above this old earth.

Here are the ten reasons why we'd all be planking down the first installment on said plane if some aircraft manufacturer would throw off his conservatism and build it:

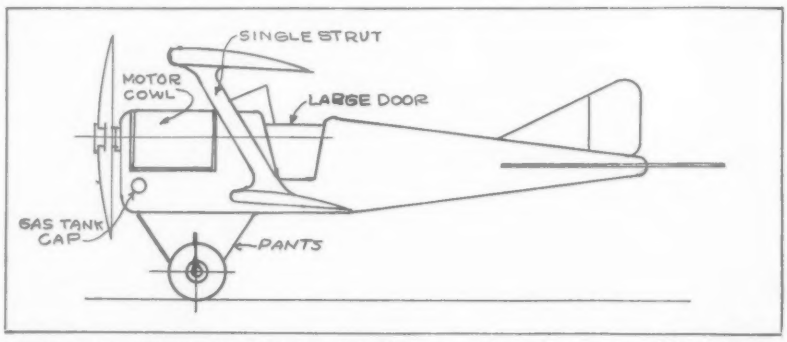
1. Two seat side-by-side arrangement.
2. Two wing struts only.
3. In-line motor.
4. Automobile motor.
5. Automobile muffler.
6. Slotted wings.
7. Full removable motor cowling.
8. Gas tank beneath motor.
9. Large cockpit door.
10. Concealed landing gear struts.

Says you, "What's so hot about them things?"

Says me, "Unbutton your ears and lemme explain."

In the first place when you and I take somebody for a sky ride (unless it's the mother-in-law) we don't want

(*Continued on page* 52)



Layout of the John Public Lightplane for which so much merit has been claimed by the author.

Answers to Official Mechanic's Exam

Answers to the sample questions issued by the Department of Commerce, Aeronautics Branch, for the examinations leading to a mechanic's license.

PART III

EDITOR'S NOTE! Before publishing the answers to the exam questions, they were submitted to, and approved by a local inspector of the Department of Commerce.

Q. For what purposes are the compression members used in the wing?

A. For resisting the compression stresses set up by the dragwire tension. They also space the spars and relieve stresses on the ribs.

Q. What is meant by the following airplane terms?

(a) Overhang?

A. The amount by which the end of the upper wing of a biplane projects beyond the end of the lower wing. Also, it may be considered as being half the difference of the two spans.

(b) Camber?

A. Camber is the curve or arch of the surfaces of a wing section. It is also the depth of the curved arch measured from the chord line of the wing section.

(c) A Wing Section?

A. It is the outline seen when an imaginary cut is made through and at right angles to the length of the wing. It is the end view of the wing bounded by the top and bottom surfaces.

(d) Parasitic Resistance?

A. The drag or resistance caused by the structural members of the airplane that gives no return in the form of useful lift.

Q. What is meant by "Wash-in"? By "Wash-out"?

A. In a "washed-out" wing, the angle of incidence decreases toward the tips. With "wash-in", the angle of incidence is greater at the tips than at the body.

Q. How would you check the stagger?

A. By a plumb bob dropped from the leading edge of the upper wing, the stagger then being the distance measured from the plumb line to the leading edge of the lower wing while the ship is shoved up in flying altitude.

Q. How would you repair an "L" shaped tear in the fabric?

A. By stitching the torn edges together, then covering the tear with doped fabric or tape.

Q. What are the advantages and disadvantages of welded joints in airplane construction.

A. A welded joint avoids the use of bolts, screws and rivets which might cause trouble by loosening. The welded joint is the lightest construction method. On the other hand, the welded joint may be defective without the defect being visible, it may be too brittle or the parts may not weld into one another perfectly.

Q. When should control cables be replaced and how may this be determined?

A. When they show broken strands, when they are flattened at the pulleys, when they are rusty or when they have become chafed by rubbing.

Checking up the tappet clearance on an airplane engine.

Q. Under what conditions should doping not be attempted?

A. When the fabric is soaked with oil or when it is damp.

THIS article, the last on the Mechanic's Exams, will be followed by a new series in our next issue. Starting with the August issue, we will publish the specimen questions and answers to the TRANSPORT PILOT'S Exams. Be sure to get them.

Q. How would you test a propeller for balance?

A. Remove from engine and support it on a knife edge in the hub. If it is not in balance, the heavy end will drop. Another method is to place a short shaft through the hub and then support the ends of the shaft on absolutely level rails. The prop should then be in equilibrium at any point.

Q. What five things would you check to determine the cause of vibration in an airplane? Disregard the engine.

A. (1) Slack control wires. (2) Loose aileron or rudder hinges. (3) Slack stay wires. (4) Loose wing connections. (5) Loose fabric.

Q. Why are cables not used for internal wing bracing.

A. They are likely to stretch more than solid wires. They are also more likely to rust.

Q. What should be done to an airplane so that it would not be necessary to hold right rudder for straight flying?

A. (1) Reduce incidence on left wing or increase incidence on right wing. (2) Readjust the vertical fin.

Q. What kind of Glue is used in aircraft manufacture and how is it mixed?

A. Casein glue mixed with cold water.

Q. Name five kinds of stress to which the various parts of an airplane are subjected.

A. (1) Tension. (2) Compression. (3) Shear. (4) Torsion. (5) Crushing.

Q. Name two types of wing spars commonly used.

A. (1) The "I" beam type. (2) The box type.

Q. How are wires on a plane protected against rust?

A. By a coat of tin over the wire, or or a coating of cadmium.

Q. Name three ways of correcting for nose heaviness.

A. (1) Readjust horizontal stabilizer. (2) Readjust stagger. (3) Move C. P. forward.

Q. Describe fully how a tubular repair is made at a station point in a longeron or motor bed?

A. The damaged member should be entirely removed and replaced by a tube of preferably the same size and gage, or at least equal to the original tube in strength. The replacement tube is now welded in at the joint.

Q. Where can a wood wing spar be spliced?

A. At any point except at a main wing fitting which shall not overlap any part of the splice.

Q. How many coats of dope shall be applied to new fabric?

A. At least four coats of dope shall be applied to all new fabric.

Q. Describe how you would repair a badly crushed leading edge of a wing in which several ribs were broken in front of the spar.

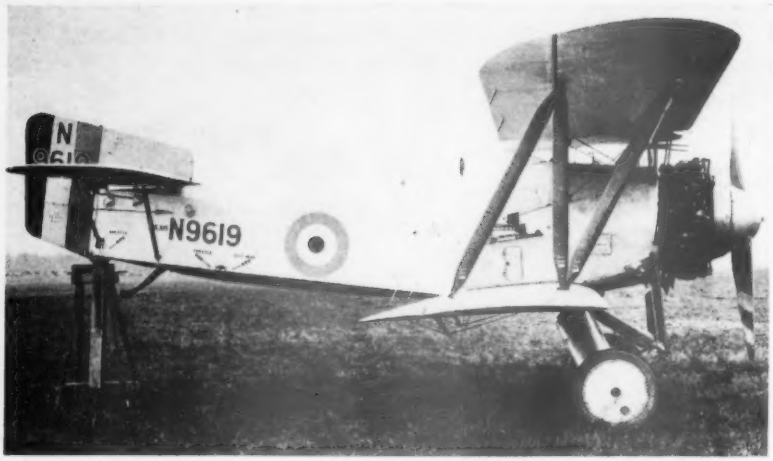
A. A new leading edge can be spliced in by reinforced splices. If three or less adjacent ribs are damaged, they can be repaired or spliced. If more than three adjacent ribs are injured, new ribs or completely rebuilt ribs must be used.

Q. Describe how you would repair a badly crushed section of steel tube longeron.

A. The damaged member should be removed and replaced, leaving if pos-

(Continued on page 56)

The Fairey Flycatcher



The Fairey Flycatcher, shown here in reply to requests from our readers.

THE Fairey "Flycatcher" has been supplied in large numbers to the Royal Air Force, the flying branch of the British defenses. Although the "Firefly III-F" has been more recently developed, the "Flycatcher" is still excellent for training. The plane is retained particularly on account of its robust construction, ease of control and a very low landing speed.

The "Flycatcher" is of wood and metal construction, the metal being chiefly used around the motor. The wings are equal in size, but have an exaggerated stagger, giving the pilot a very clear view.

The standard engine is the Armstrong-Siddeley "Jaguar" type, but the Bristol "Jupiter" engine can be fitted if desired. The tank capacity is 62½ U. S. gallons of fuel. A jettison valve is fitted to the fuel tank. Wheels or pontoons can be fitted to the undercarriage as desired.

Testing Navy Aircraft for Airworthiness

AIRPLANES are built for the United States Navy in accordance with the terms of a contract which specifically guarantees certain weights, performance and suitability. When a plane is first received it is generally given a single flight by the contractor's pilot. This is called the contractor's demonstration, the purpose of which is to show the probability of the airplane being able to meet its gurantee. Assuming that the demonstration has been satisfactory, the plane is then delivered to the U. S. Navy Flight Test Section at Anacostia, D. C., for trials.

Every airplane represents somewhat a different problem, although the same general program of tests is applicable to all. The large flying boat, the small submarine plane, the autogiro and the high performance plane, represent the wide variety of types that are constantly being delivered. A routine test, however, always begins with the weighings, both empty and fully loaded, from which the position of the center of gravity is determined.

Then follows complete photographing, covering not only the airplane with all its equipment in place, but also any items of unusual interest or peculiar construction which might be of future value. The machine is now ready for flight testing—climb, speed, stability and maneuverability, and also the determination of any special characteristics of the type.

The information obtained from the speed trials is:—First, the maximum speed. Second, the minimum and landing speeds. Third, data for a calibration of the airspeed meter used in subsequent tests. The speed is determined by flying the airplane back and forth on an accurately measured course over the water, adjacent to the shore line and at a very low altitude, so that no errors are caused by climbing or diving.

The pilot is provided with a special chronometric watch—recording time to the tenth of a second—mounted on a recording board strapped to his leg. On this board, at the completion of each run over the speed course, the pilot notes the exact time and the readings of the various other instruments during the run.

Normally the second test is that to determine the climb characteristics. In preparation for this there are installed two barographs to constantly record the pressure altitude, a statoscope to establish the level flight condition, a thermometer to indicate free air temperatures and, in ships with a high ceiling, oxygen equipment for the pilot.

(*Continued on page* 53)

A Pioneer in Aviation

by J. F. PAINTER

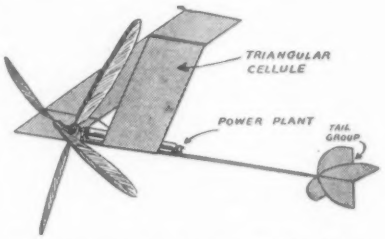
AMONG the early experimenters with heavier-than-air craft is William H. Martin, aged 76, of Canton, Ohio.

Mr. Martin claims the distinction of being the inventor of the first monoplane to fly. The patent on his ship is dated September 28, 1909.

Immediately after receiving his letters patent he took his plane to the Hudson-Fulton Exhibition at Morris Park, New York. Swift winds were encountered and of all the entries, only two planes made successful flights—that of Glenn H. Curtiss and the one piloted by Mr. Martin. Horses and automobiles furnished the motive power for these propellerless ships.

It was while watching small boys at play with their sleds in the snow, rather than by observing the flight of birds, that Mr. Martin formulated his theories of balance and lift.

These theories he applied with such accuracy that the model of his first plane, pictured herewith, rights itself in midair regardless of the position in which it is launched. Perfectly banked



Showing a model of the early Martin airplane.

turns, which carry it in a wide boomerang-like circle from Mr. Martin's right hand to his left, are executed by this tiny craft.

Claim No. 10 of his patent, No. 935384, shows the way in which Mr. Martin anticipated further developments:

"In a flying machine, and aeroplane, balancing planes located below said aeroplanes and extending downward and toward each other from the aeroplane; a motor located below said aeroplane; rotating blades actuated by said motor, and having their axial line below the aeroplane and below the greater resistance to the device while being propelled through the air, and a rudder having a horizontal blade arranged to oppose the tilting of the device caused by locating the axial line of the propellers below the aeroplane and below the greater resistance to the device while being propelled through the air, and having a vertical blade to direct and control its course."

Mr. Martin's first ship has been taken to Smithsonian Institute, Washington, D. C., where it is mounted for exhibition.

XUM

What Our Readers Are Building

A department devoted to our readers' activities in airplane, glider and engine construction, showing the latest developments in the amateur field.

Come On, You Fellows!

SAY, fellows, just help out a poor working lad, will you? For a long time the photos of homemade gliders and lightplanes literally poured into the office, but they are now coming in so slowly that we haven't enough to properly fill our issues.

Perhaps you intended to write up that ship of yours and send it in but have been careless. Please push matters and send us the dope because we sure will need it by the time our next issue goes to press.

Now, we know that this is not due to any lack of interest in this column, for we receive letters daily from our readers, telling us of their interest in this work. They are hot on the subject of lightplanes and gliders. So just take a few minutes, take a shot at your ship with the Brownie or any other camera that you use, jot down the main facts on a piece of paper and shoot it in. We'll be waiting.

Experiences of a Glider Club

Head-on view of the Unaka glider.

THOMAS E. CECIL, Erwin, Tennessee, is a member of the Unaka Glider Club, who have built this glider from plans published in POPULAR AVIATION. We are always glad to have such excellent proof as this of the value of our plans.

To date this glider has been launched about 300 times and in spite of the fact that all of the members of the club were originally "rank novices" there have been no serious injuries.

As another bunch of roses, Mr. Cecil informs us that a Heath Parasol, built from our plans, is practically completed.

A Big New Idea

UP IN the northwest side of Chicago, one of our readers is diligently experimenting with a radically different kind of lightplane. We trust that it will work out successfully so that we can give a detailed description later.

In short, this is a twin-motored 24-foot biplane equipped with two converted motorcycle engines.

New Baby Aircraft on the Coast

The extremely small size of the H. C. Smith lightplane can be understood by comparing it with the stature of its builder standing at the right.

ANOTHER experiment in miniature aircraft design is being made at Aberdeen, Wash., by Harold C. Smith of Montesano, Wash., who has constructed a tiny biplane in which he has made some test hops from the sands of Pacific Beach in Southwest Washington.

This little biplane has an upper wingspread of 15 feet, a lower span of 12 feet, and a 30-inch wing chord. The Clark "Y" wing section was used. The ship carries two gasoline tanks in the upper wing with a total capacity of five gallons.

The plane is powered by a 25-horsepower Indian Ace motorcycle engine. The flywheel is removed and a thrust, bearing and propeller, are added. The propeller is 4½ feet in diameter, with a theoretical 32-inch pitch. The ship weighs 230 pounds.

Smith says his ship has a top flying speed of 90 m.p.h. and lands at about 40 m.p.h. In the few tests he has made, it requires about 300 feet to get off the ground. Having comparatively small wingspread, the principal requirement of the ship is a motor with about three times the power of the one used. It was built at a cost of about $180, but Smith says that the material required for building it commercially and with an engine about three times as powerful, would bring the cost of the ship to about $600, if it were being built to market.

Collaborating with Smith in the construction and testing of this tiny ship, was George Karshner, Montesano, Wash., who at the same time built a miniature monoplane. Though small, this ship is larger than Smith's. It has a wingspread of 25 feet, a 4½ foot chord, and is powered with a 30-horsepower Henderson motorcycle engine.

Karshner has made a few tests, the first ending up in a minor crack-up, when a gust of wind caught the tail of the little ship as it was being landed. The propeller was broken. Karshner has made similar tests of this sort but not being a pilot has never attempted to get altitude or distances. Smith, however, is a pilot of experience and has attained a considerable altitude in his ship.

Want Some Dope on Performance

WARREN ULIN, Hunter, Kan., has a little kick to register. Here is a part of his letter:

"Is it possible to get those lightplane builders that are showing their ships in 'Our Page' to kick in with the dope on their ships, such as the climb, top and landing speeds, takeoff, run in feet and the weight of their crates? That's what I'm most interested in about home-built ships."

We agree with Warren. Very seldom do we get such specifications. We are always glad to print them—but what can we do? In addition to that information, we are anxious to get the dope on rigging up the Fords and Chevies, and what have you, for service in the air. How about it, fellows, will you give US a break?

New Heath Monoplane Has Many Features

A close-up of the new Heath monoplane with wind-scoop cowl and wing window.

THE new Heath monoplane has created a great deal of interest, because of the many new features that have been introduced since Ed Heath built the first Heath "Parasol".

First of all we note the window in the center of the wing which gives the pilot a better range of vision than in the old type. There is more room in the cockpit and the engine has been provided with a new cowl and wind scoop. The original "parasol" wing arrangement has been adhered to, however.

Charles Bryant Completes a Cabin Job

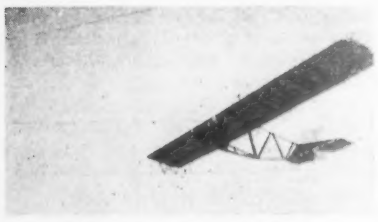
Bryant's "Alco" cabin ship.

OUR thanks are extended to A. C. Fowler, Hurricane, W. Va., who sends us a photograph of this nice looking "Alco" cabin plane which was built by Charles Bryant, 1021 Crescent Road, Charleston, W. Va. It was sold later to Henry M. Church of Odenton, Md.

This is the first cabin plane that has turned up in a long time and the builder is to be congratulated for his ambition and success in making this rather elaborate ship. If there are any more home built cabin jobs we certainly would like to get the dope on them.

Mr. Fowler is building a Health Parasol for his own use and expects to have it in the air within a short time. We'll be waiting for the photos—you bet. He wishes us to announce that he has a new 28 h.p. Lawrance engine and prop for sale at $50.00.

Roosevelt Club Glides at High Altitude



Roosevelt glider in flight.

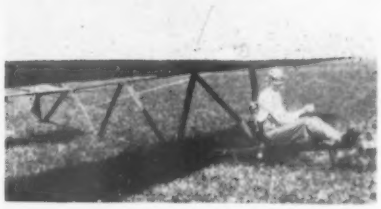
'WAY out in Roosevelt, Utah, the six members of the Roosevelt Glider Club have successfully built and flown their own glider.

When we consider that their flying has been conducted in the high altitude Rocky Mountain regions, they are to be given special credit for their accomplishments. They use the towing method of flight.

The members claim the distinction of being the first to introduce gliding into their section of the country, and their object is to stimulate interest in aviation in this district. Fine—let's hear from you again.

This brings to mind the difficulties experienced at high altitudes by airplane and glider pilots alike. The air is so "thin" that the speeds are much higher at take-off, thus adding much to the difficulties of piloting and the choice of terrain.

Club Builds Glider from Kit



W. S. Hicks sitting in the Eaglets' glider.

WELDON S. HICKS, Fillmore, Ill., sends us this photograph of the glider built by the Chicago Eaglets Glider Club. This glider was built from a Mead kit-set and has proved very satisfactory, having been flown from an altitude of about 500 feet.

Mr. Hicks is now building the same type at his home in Fillmore, Ill., and promises to send us more photos when it is completed. He also announces that he is in the market for a good 10 h.p. to 25 h.p. engine for powering this glider, the engine to weigh less than 100 pounds.

He says he is going in for gliders and lightplanes in a big way—good luck to him.

Gliders Get Instruments

IN Germany, where this picture was taken, there has been quite a little work done in the design of instruments for gliding. The picture shows a cape-like covering being fitted over the cockpit of a new type glider. Mounted on the front of this cowling are the instruments.

It is quite possible that instruments for gliding will develop quite rapidly, much more rapidly than did the instruments for airplanes. Many of the gadgets used in airplanes can be easily adapted for gliders.

What is really needed is a gust and uptrend predictor that will give notice of air changes in advance of their striking.

Showing the instruments in the glider.

XUM

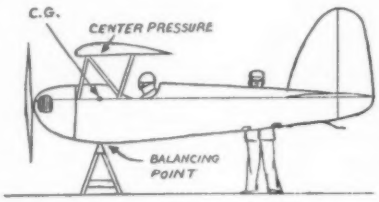
Lightplane Alignment and Adjustment

by F. NAGEL

LET'S say that you are building a a lightship, or are at least planning one. To avoid a lot of grief later on, and also a lot of trouble, see that the plans of your ship call for adjustable control wires and struts that can be adjusted when the ship is test flown. The same goes for any other struts or wires that support the control surfaces, or fixed tail surfaces.

The reason for doing this will be apparent to you later. And now a word or two about something that should be attended to before the ship is covered. This relates to the position of the wheels. Standard practice in designing large ships is to place the center of the wheel on a line that meets the center of gravity at an angle of thirteen degrees.

When the ship is in flying position, the bottom of the prop should be on a



Balancing ship on trestle.

line with the hub of the wheel, or at least very little below it. On light ships, however, the wheels may have to be placed a little behind this position on account of the low power available, so that the tail will lift quickly and the ship goes into flying position without a long run.

Do not place the wheels too far to the rear or you will have a ship that will nose over on the least provocation. The position of the landing gear is very important for much trouble has been caused by placing the gear so far to the front that taking-off was impossible due to the great tailskid drag. This slowed the ship down so much that it could not gain takeoff speed.

WELL, let us say that your ship is now completed, and you are now ready to balance and rig it. First we will take up the balancing of the ship. There are two methods of balancing, the mathematical and the so-called knife-edge method. You can determine the exact position of the center of gravity (c. g.) before you even build your ship if you know the weight of all the parts except the wings. This process was explained in great detail in the April issue.

When you have found the c. g. of your ship, place the wing in the correct position, with the center of lift about one inch to the rear if the ship is a monoplane or unstaggered biplane, and one inch to the rear if a staggered biplane. You are now ready to rig the ship for its test flight.

Light monoplanes are generally rigged with about two degrees incidence and no dihedral. Light biplanes are generally rigged the same way, though the amount of stagger depends on the ship.

Line-up everything so that all is true and have some good test pilot test hop your ship. Be sure you get a pilot who can tell you what's wrong and what needs to be done to make the ship trim and fly right.

Now say that the ship has been test flown and found to be in need of having the rigging changed so as to make the ship fly trim. Now you can see the need of having everything adjustable.

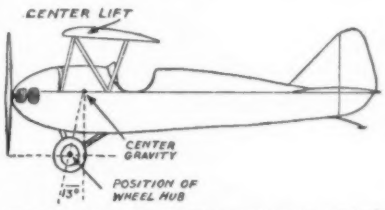
MAJOR ADJUSTMENTS

Fore and aft balance—For nose heaviness, lower front of stabilizer, if it is adjustable. Move wing forward or motor rearwards if wings cannot be moved. If this cannot be done, the pilot's seat can be moved rearwards. For tail heaviness, do just the opposite.

For wing heaviness—If the ship tends to go off to one side, or a wing tends to drop when the stick is released while flying, the trouble can usually be found with the rigging of the wings or fin.

To correct for the right wing dropping, the trailing edge of that wing should be lowered, and the trailing edge of the other wing should be raised an equal amount. The reverse applies if the left wing is heavy.

To lower the trailing edge, the rear strut on that side should be shortened, or the front one lengthened—if a strut braced job. If a wire braced job, such as some types of monoplanes and biplanes, the wires to the rear spar should be shortened, or those to the front spar lengthened in the case of the



Showing how the wheel location is related to the center of gravity.

flying wires. The front wire is shortened and the rear wire is lengthened in the case of the landing wires.

Dropping the trailing edge at the tips is termed "washin" and raising it is termed "washout". Washout tends to lower a wing and washin tends to raise it. In correcting the rigging of the ship, to make it fly hands-off, the correct amount of either "washin" or "washout" can be found only by experiment. Be sure, however, to safety all nuts, turnbuckles and wires after you have changed the rigging and before the ship is hopped again.

(*Continued on page* 66)

Model Meet at Newark, N. J.

ONE of the outstanding model airplane contests of 1932 will be held July 23rd, at Branch Brook Park, Newark, N. J. This contest is sponsored by the Scientific Model Airplane Company, and the judges will be men of note in the model airplane field.

This competition is open to everybody, no registration being required, and fourteen valuable prizes will be given to the successful contestants, including cups, medals and wrist watches. Simply bring your model to the field between the hours of 9 a. m. and 2 p. m., and try for one of these valuable prizes. Hundreds of boys will come from all parts of New York, New Jersey, Connecticut and Pennsylvania.

There will be two classes—the Junior and the Senior, the Junior class being for boys under 14 years of age, while the Senior group will be for boys above 14 years. Probably the most prominent event will be the novice free-for-all in which both the Juniors and Seniors will participate. Mr. John Hulstrunk, model airplane supervisor for the Board of Recreation, Newark, will act as official timer. The various events are outlined as follows: Commercial—the hollow cross-sectional area to be no less than four square inches. Twin pusher — no rules. Gliders, hand launched—for endurance, all balsa construction. Novice event—any size, kind or shape of airplane model.

Modern Inventions Aid in Plane Building

MANUFACTURERS of airplanes have discovered that dry ice has a definite and valued place in the construction of military and commercial planes.

The dry ice is used in the treatment of duralumin rivets, which have a tendency to become too hard for effective use after they are heat-treated. To arrest this hardening the rivets are stored in boxes, in which dry ice is placed, immediately after being heat-treated. The cold temperature prevents the rivets from hardening. As they are required, they are taken from the box and used.

A second modern product just beginning to find a use in the airplane industry is cellophane.

It is customary in the construction of metal wings to use aluminum foil to protect metal parts from dope sprayed on the fabric covering. Now cellophane is being used for a like purpose with results which are reported entirely satisfactory.

The material is cut in thin strips and one side is coated lightly with varnish. It then is applied to the structure when the varnish is sticky. The next step appears to be gummed cellophane for this purpose.

XUM

New Enlarged Model Department

Building the "Junior" Low Wing Monoplane

by POP STICK

An easily constructed duration contest model of excellent performance.

WITH the coming of contest weather, the models suited for outdoor flying and for long duration events will take the lead in activities. The design presented in the present article is strictly a contest model designed for long duration.

The body structure is very simple. The wing ribs are all the same and the entire model ready to fly should weigh approximately one ounce complete. The test model weighed one ounce and one quarter. On the first trials, six strands of one-eighth inch flat rubber were used with a ten-inch propeller.

It then appeared to be a trifle underpowered, so another strand of rubber was added, which increased the climb of the model considerably, but shortened the duration of the propeller revolutions. But the increased climbing ability caused the model to reach smoother air and increased its duration. As suggested, it is best to keep the weight of the model down to one ounce, or less, so that five or six strands will fly the model and give the same climbing ability as seven strands.

No motor stick is used. An "S" hook may be attached to the front end, as the complete nose is removable, and it can be wound from this end. The test model was a trifle tail heavy and a small weight was added to the nose to properly balance the model. Adding a small weight is not a disadvantage, for the added weight in front will tend to bring a model out of the stall much quicker than one without an added balance weight.

When the model tends to stall, the additional weight in the nose will always tend to bring the front end down very quickly, and in this way counteracts the stall by causing the model to nose down and increase its speed. It prevents the model from gliding back on its tail, which causes a model to lose altitude rapidly.

When a model stalls, and slides back on its tail, it loses a certain amount of altitude. Then, as it recuperates, it has to dive, and in doing this it loses additional altitude. This is repeated constantly when a model is unbalanced or tail-heavy. Even though a model tends to stall, when balanced with a small weight in the nose, it does not slide back on its tail, but merely noses over slightly and continues on its flight. This is repeated time and again on some models, but because the recovery is quickly accomplished, the model does not lose altitude and continues flying.

Copy full-size layout of the fuselage, as illustrated in the small drawing, and build up two sides exactly alike. When these two sections are dry, assemble them as illustrated by the top plan. When cutting the cross-pieces, cut two at a time so that the top and lower sides will be rectangular around the entire body. At the front end, the longerons may be cracked so that they meet inside of the round nose section and do not bulge beyond the contour as illustrated. The crosswise bracing, from one station to another on the side view, is very essential as it prevents the body from twisting when the motor is wound.

At the right, the Junior duration model is just being launched for its test flight.

The view below will give a good idea of its appearance when viewed from below.

During these tests, this simple model flew well and while no attempts were made at making a record, yet it is likely to show up well in its class.

ABBREVIATED BUILDING INSTRUCTIONS

1. Make two body sides.
2. Cement the two sides. (Top view.)
3. Build the cabin.
4. Build the rudder.
5. Build the stabilizer.
6. Build landing gear. (All bamboo.)
7. Wheel pants.
8. Make wheels.
9. Cut out ribs.
10. Nose ribs.
11. Assemble wings.
12. Cover body.
13. Cover wings (two colors).
14. Propeller-shaft-nose block.

BODY (LIGHT BALSA—3/32 INCH SQUARE)

CABIN (LIGHT BALSA—1/16 INCH SQUARE)

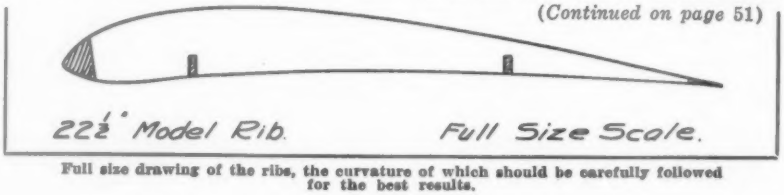
The cabin on this model gives a finished appearance and adds considerably to the attractiveness when on display and in flight. The added weight is negligible and cellophane should be put over the windows, around the front and one window length on the sides and on top.

RUDDER (BAMBOO OUTLINE—3/32 x 1/16 INCH. BALSA STRUCTURE—1/32 INCH SHEET)

A continuous piece of bamboo is used for the outline of the rudder and the inside parts are built up of thin balsa sheet. It is not necessary to have the tail units of double thickness and cambered. A thin flat section covered on one side only will answer the purpose very well, however, warping of this type of structure tends to take place more rapidly than with a double surfaced tail.

In using a single surfaced section, the tissue should not be drawn taut, but left just as put on. The double section tail may be sprayed with water, which will make a nice smooth finish

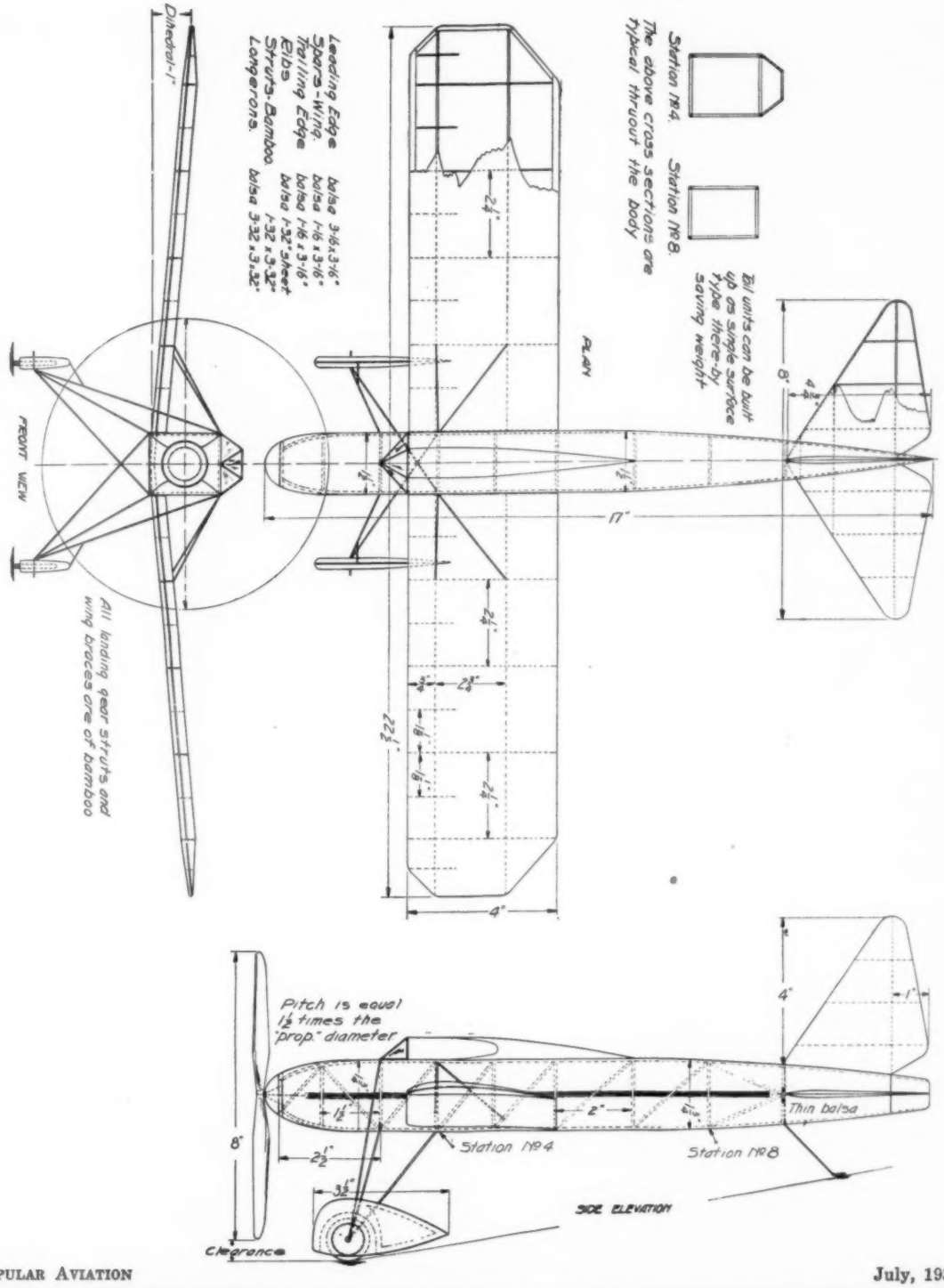
(*Continued on page* 51)



Full size drawing of the ribs, the curvature of which should be carefully followed for the best results.

The "Junior" Low-Wing Monoplane

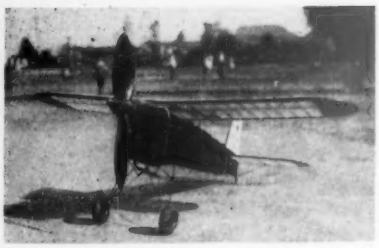
A Duration Contest Model


Dihedral-1"
Leading Edge balsa 3/16 x 3/16"
Spars-Wing. balsa 1/16 x 3/16"
Trailing Edge balsa 1/16 x 3/16"
Ribs balsa 1/32" sheet
Struts-Bamboo Longerons. balsa 3/32 x 3/32"
Station No 4. Station No 8.
The above cross sections are typical thruout the body
All units can be built up as single surface type thereby saving weight
PLAN
FRONT VIEW
All landing gear struts and wing braces are of bamboo
17"
22½"
4"
Pitch is equal 1½ times the "prop." diameter
8"
Clearance
Station No 4
Station No 8
Thin balsa
SIDE ELEVATION

New Ideas for Our Model Builders

New Model Building stunts of interest, gathered from far and near for our readers.

Plenty of Speed



Mr. Chandlee's monoplane model that was timed at 48 m.p.h.

MR. E. V. Chandlee, 1632 Bellevue Ave., Los Angeles, is the Director of Miniature Aircraft, for the L. A. Playground Department. The photograph is of one of his nine-ounce speed models having a 27 inch wing-spread and a 11 inch prop. This model has been officially timed on a 88 foot course at 48 m. p. h.

Mr. Chandlee is very interested in model work and has many plans and ideas for all kinds of model planes. Some of his planes can drop bombs and make smoke screens.

A Model Maker's Lab.

Joe Ott's laboratory sees a lot of service these days.

AT last we have a picture of Joe Ott's workshop. It is the answer to the many requests for just such a picture.

All of the models that have appeared in POPULAR AVIATION are made and tested in this shop before being published.

Now, this is only one corner of the shop, and there are many other corners just as interesting as this.

Notice the models in the background. That German war plane is a Pfalz. It looks as though it were actually flying. A few fine wires provide the illusion.

Gordon Christoph, the boy at the table, is one of Mr. Ott's assistants. He is building up a model that is soon to appear in the magazine.

A Fine Idea

NO fellers, I ain't been cross the oshen, or wreckt a few airplanes, or sunk a cupple uv subs but I got a little story here I thought perhaps you would be interested in.

A few years ago I decided to get into aviation but financial conditions held me up. Not knowing what to do I thought perhaps I could make and sell a few model airplanes. The next morning I started construction on a Fokker monoplane. In a short time the model was finished and much to my surprise the first fellow I showed it to asked me if he could buy it for fifty cents.

That was the way it all started. With the fifty cents I purchased wood and paint to make more models. Soon I found it was easier to make one type of plane instead of six or seven, so the Eaglerock OX5 training plane was put into production.

The next day five Eaglerocks were on the line for sale. Good news travels fast and in less than an hour nearly every young fellow in the neighborhood was wishing he could buy one. In a short time I had about a week's work lined up.

I opened a model airplane shop and started filling the orders as fast as I could. Some of the boys wanted a Waco, others wanted a Ryan and before I knew it I had a regular airplane factory started and was running full blast.

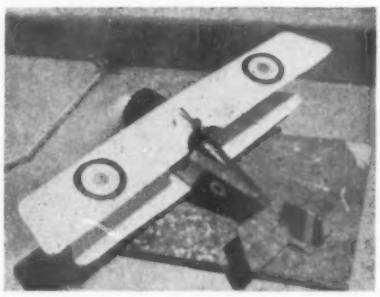
Since then I have made over three hundred models, all of which brought a good price. Monoplanes and biplanes as well as commercial and military planes were in the lineup. These planes had wing spans from six to thirty inches and sold from twenty-five cents to two dollars.

On June 29th, 1931, my dreams came true. I had saved up enough money to buy a share in a local flying club. A month later I received my student's permit and in August started flying. Since I made the grade I found it very interesting to teach others how to make these simple models and see them get into aviation the way I did.

In this way, slowly to be sure, the small models eventually led the way to the big machine and flying. What was first only a passing fad, finally proved a means of taking up aviation in earnest.

So you readers of POPULAR AVIATION who think you can't afford to take up flying, think over this way of getting the ball rolling. Perhaps this will be a way for you to get those needed dollars started.

Carefully Built Nieuport



A mighty good looking Nieuport, insignia and all.

A NIEUPORT SCOUT warms up on a shingle. Lawrence Lynch of 110 E. Elm St., Independence, Mo., has made this model from plans in P. A.

Thank you, Lawrence for the kind words you use to praise our model plans and drawings. We are glad you like the drawings without dimensions. There have been some objections to our not including figures, and we are glad to hear an approval. Thank you.

A Flying "Vega"

Here's a Vega that looks real.

LOCKHEED-VEGAS seem to be popular for our model builders. Here is a flying, scale-model that was made from factory drawn plans.

It is 21¾ in. long, 31½ in. wing span, and weighs 1¾ oz. The prop in the photograph is for exhibition purposes but can fly the model for a short distance. The flying prop is 3 in. longer (10 in. long).

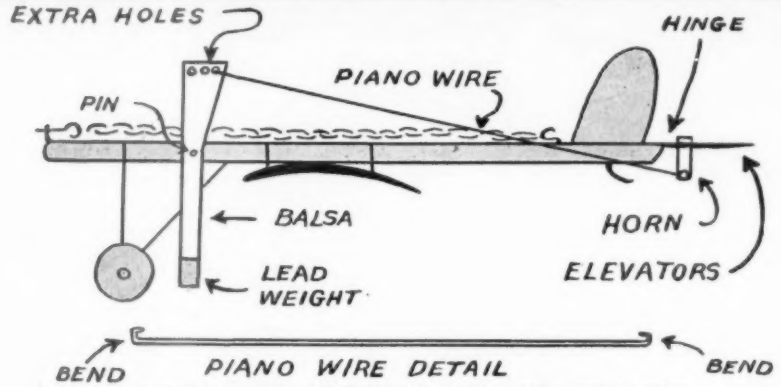
This model was made by Howard Earp, of Payette, Idaho. Fine work, Howard.

A Handy Tip

MANLEY SPINCO, 1665 W. 5th St., Brooklyn, N. Y., has sent in something a little different from the usual run of contribs for these pages. He has a filler for cavities in solid models.

To make this filler, he takes some ambroid and mixes it with balsa sawdust, making a rather stiff mixture. Force this into the holes.

An Automatically Controlled Model Stunt



Layout of the automatic stabilizing system for models described below.

ONE of our readers, who very modestly concealed his name and address, has sent us a very interesting sketch of an automatically stabilized model. At least it is stabilized in a longitudinal direction.

As you will see from the diagram, the elevator is connected by a wire to a vertical pivoted lever. At the bottom of the lever is a small lead weight, so attached that the lever acts like a pendulum.

When the model's nose dips down or rises, the pendulum lever causes a corresponding correction in the elevator position, and the model once more is directed into its proper horizontal position. This will prove an interesting experiment.

JOSEPH OTT, model editor of POPULAR AVIATION, *has an important message for you fellows. It is a chance for you to make some money very easily and to get some of his excellent full sized plans free.*

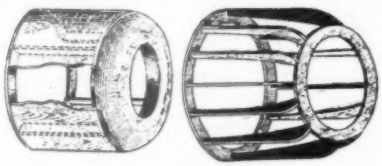
In order to have as many new ideas as possible in this department, Mr. Ott offers $1.00 in cash and 15 full-size scale model plans for each short article accepted on model building methods, construction "kinks" or model flying.

These articles should be as brief as possible—similar to the kinks published in this issue—and should be accompanied by a rough sketch. If necessary, we will rewrite the story and make the finished drawings at the office.

Don't be afraid to send us your story just because you have never written an article before. What we want is your ideas—we'll do the rest.

Address your ideas to Joseph S. Ott, Model Dept., POPULAR AVIATION, *608 S. Dearborn St., Chicago, Ill.*

How to make Cowl Rings and Noses



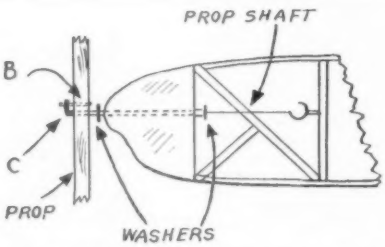
Cowl rings and noses.

MANY builders have trouble making presentable cowl rings and noses for the fuselage ends. The two accompanying sketches should make this matter clear—constructions that are both true to life and easy to make.

At the left, the nose piece is built up of very thin balsa ribs attached to the two end rings. After completion, this can be covered with tissue paper.

At the right, the front ring is carved or turned out of a balsa block, while the rear ring is of very thin material. The ribs run between the two rings. The covering can be of any thin, stiff sheet material, ranging from thin balsa to cardboard.

Free Wheeling Aids Model Flight



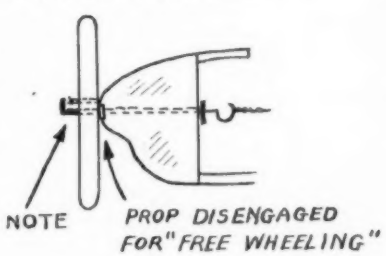
FREE wheeling on autos—why not on models?

This question has been thrashed over by Harry Buechler, 1912 Prosses Ave., Los Angeles, Cal., until he has arrived at the solution of the problem shown.

He claims that when the propeller is allowed to rotate continuously or "free-wheel," after the rubber has completely unwound, that the resistance is reduced and that the gliding angle is correspondingly improved.

This free-wheeling device consists of a prop shaft with a washer soldered to it on each side of the nose block. The prop is put on the shaft with the wire (B) in it. The prop shaft at the end is then bent over (C).

When the prop is pulling the model, the prop is forced out against the bend in the shaft. When the rubber is unwound, the air pressure pushes the prop against the nose-block so that the prop is free to spin-around.



Model Contest at Seaford

THE Seaford Chamber of Commerce, Inc., wishes to announce the Model Airplane Tournament to be held at Seaford, L. I., N. Y., on Saturday, July 2nd, 1932, starting at 10:30 A. M. This contest is run in connection with the Bicentennial Celebration of George Washington's **Birthday.**

The events will be as follows:
Junior and Senior—
1—Outdoor Twin Pusher.
2—Outdoor Commercial Flying Model.
3—Outdoor Tractor.
4—Outdoor Speed Model (any type).
5—Outdoor Replica Flying Model.
6—Scale Model Non-flying.

The Junior Class will include all boys who have not attained their 15th birthday.

The Senior Class will include all boys from 15 years of age to 20 years of age.

There will be an entrance fee of 25 cents which will include a buffet lunch.

Entry blanks will be obtained at all club headquarters and upon request by mail direct from the Seaford Chamber of Commerce, Inc., Seaford, Long Island, N. Y. Entry blanks together with fee must be filed with the Seaford Chamber of Commerce, Inc., on or before June 15th, 1932.

All model builders living in Connecticut, Massachusetts, New Jersey, New York, Pennsylvania, and Rhode Island are eligible to enter the contest. Send for the latest bulletin containing the regulations governing the contest and list of prizes.

For all information regarding contest write to: Tournament Committee, Seaford Chamber of Commerce, Inc., Seaford, Long Island, N. Y.

Building the U. S. Army Hawk P6E

by JOSEPH S. OTT

A splendid model of the famous Air Corps Single Seater.

THIS model is an exceptionally beautiful display type. Perfect balance and flying quality were secured in this model and the only mishap during the trials was a broken landing gear and a section of the wheel pants when the model struck a corner of the curbing and was turned over by a puff of wind. The total weight of the thirty-inch model is three and one-quarter ounces.

Being of the biplane type, a large wing area was secured, hence the model glides very slowly, which at first sight would not seem to be the case. The angle of incidence employed in both wings is $\frac{1}{32}$ to the inch. The under camber is flat on all the ribs.

It was necessary to add a small weight to the nose of this model to help maintain longitudinal balance. The radiator, machine gun and exhaust pipes are not shown in the photographs of this model but may be added depending upon the builder's tastes. These additional parts will add a trifle to the overall weight of the model, but should not be sufficient to impair its flying qualities.

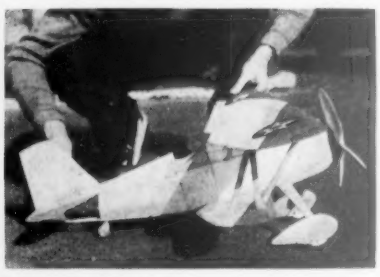
WING STRUCTURE

THE longest top wing rib for the 30-inch model has a cord of 6¾ inches. The smallest rib has a cord of 4½ inches. Lay out a 30-inch wing and place these two ribs on their proper location on the drawing. The remaining ribs spaced properly will give the correct length. When cutting the ribs, the five ribs in the center of the wing may be made alike with the exception of the length, which will vary a trifle.

The rest of the ribs, because of the taper, will vary both in thickness and in length.

THE FUSELAGE

THE various views along the cross-section of the fuselage illustrate the shape at different points. The main portion of the body is built up rectangular with longerons and cross-braces. At the front end, the shape is elliptical and conforms to station number (2) which is clearly illustrated by the heavy line on the outside in the front view. The small heavy circular line shown on the front is the shape of the end of the nose block.



A straight side view of the P6E.

This entire nose block is removable and is held in position by a square block that fits to the inside fuselage shape. The propeller and shaft are held in place by the tension of the rubber which holds the nose block at the same time. Small snappers may be used to good advantage to assist in holding the nose block in position. These may be sunk into the block flush.

The rubber is held in place at the rear by a cross-bar which sets into a small slot on both sides of the fuselage.

The Hawk is a beautiful model that your friends will admire.

MATERIALS REQUIRED— 30-INCH MODEL

1. Longerons — $\frac{3}{32}$x$\frac{3}{32}$x24 inches, 8 pieces.
2. Cowling—$\frac{1}{32}$x3x24 inches.
3. Fairing — $\frac{1}{32}$x$\frac{3}{32}$x24 inches, 10 pieces.
4. Ribs—$\frac{1}{32}$x3x24 inches, 2 pieces.
5. Spars—$\frac{1}{16}$x$\frac{1}{16}$x30 inches, 5 pieces.
6. Trailing edge—$\frac{1}{16}$x$\frac{3}{16}$x24 inches, 2 pieces.
7. Entering edge—$\frac{3}{32}$x$\frac{3}{32}$x30 inches, 2 pieces.
8. Struts — $\frac{1}{16}$x$\frac{3}{16}$x24 inches, 2 pieces.
9. Wing tips and outlines—Bamboo, $\frac{1}{32}$x$\frac{1}{16}$ inch.
10. Rubber—$\frac{1}{32}$x⅛ inch, 10 strands.
11. Propeller blocks — $\frac{5}{16}$x¾x4½ inches, 3 pieces.
12. Wire for shaft—.029 diameter.
13. Tissue—Red and white: 2 white, 1 red.
14. Dope—1 can.
15. Cement—1 large tube.
16. Emblems—Stars, 2 3-inch and 2 2-inch, tail stripes.

The P6E just before the take-off.

The last fuselage section is left open so that this cross member may be reached.

LANDING GEAR—WHEEL PANTS

THE landing gear for this type of model must be very strong. This is accomplished by using thin bamboo on both sides of the struts. The bamboo continues into the wheel pants and also along the upright of the fuselage cross brace. A small thin piece of bamboo is also used for a cross brace to strengthen the wheels sidewise and prevent side-sway.

Two types of wheel pants are illustrated. The one at the front shows the true type used on the large machine and the angle of the wheels extend outward. This type may be turned up on a lathe and hollowed out for lightness. The other type, illustrated in the model section, is the type that is used in the majority of cases.

RUDDER AND STABILIZER

THE front part of the rudder is a thin piece of bamboo bent to the proper shape, while the trailing edge is balsa. The entire structure is $\frac{1}{32}$-inch thick balsa—built up—and having a double cambered rib section, the same shape on both sides. Because of the tendency to warp, when the decoration of the tail stripes is added, additional criss-cross bracing is employed.

It is surprising that this thin bracing makes the tail sections, once they are cemented in their correct form and dried. The stabilizer is built in a similar manner. The two bamboo leading edges meet at the front and are cemented securely to a balsa cross-member which sets into the fuselage. The correct position is given so that the stabilizer is slightly higher than the longerons.

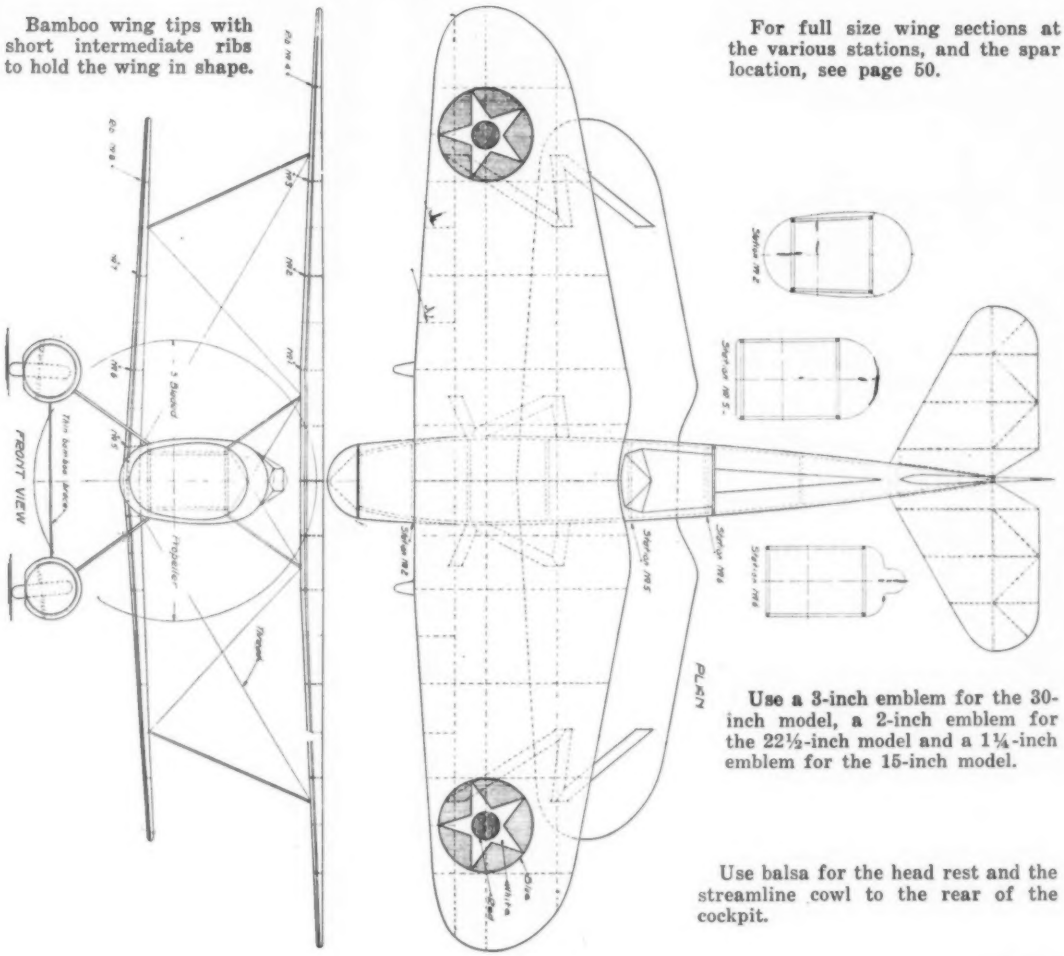
(*Continued on page* 50)

The Curtiss-Wright Hawk-P6E

A Flying Scale Model

This is an exact replica of the latest U. S. Pursuit Biplane of that name

Bamboo wing tips with short intermediate ribs to hold the wing in shape.

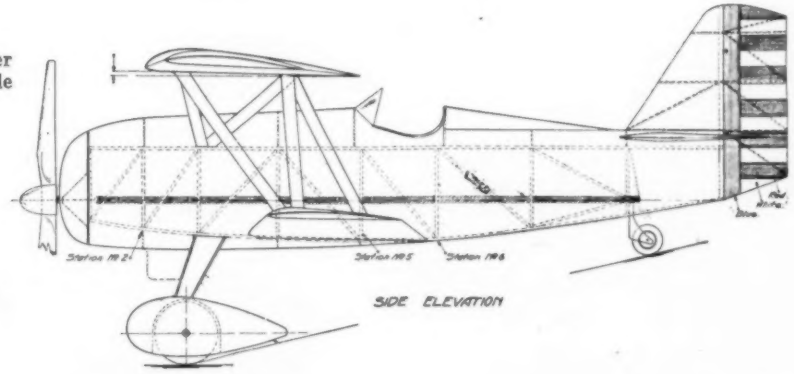


For full size wing sections at the various stations, and the spar location, see page 50.

Use a 3-inch emblem for the 30-inch model, a 2-inch emblem for the 22½-inch model and a 1¼-inch emblem for the 15-inch model.

Use balsa for the head rest and the streamline cowl to the rear of the cockpit.

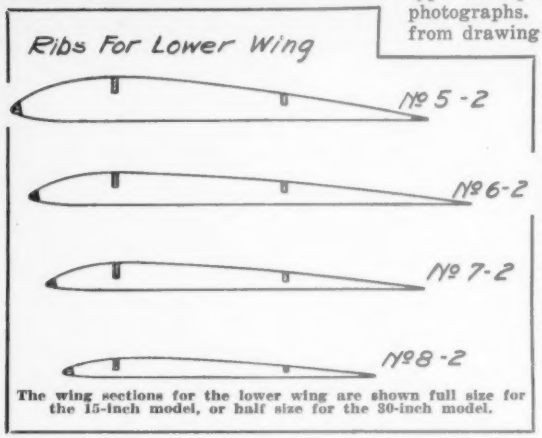
Set both upper and lower wings at an 18-degree angle of incidence.



Use balsa for landing gear struts and reinforce with bamboo.

Hawk Model

(*Continued from page 48*)



The wing sections for the lower wing are shown full size for the 15-inch model, or half size for the 30-inch model.

INTERPLANE STRUTS

THE struts on this model are made of 1/8 x 3/8-inch balsa, streamlined and cemented rigidly together before being placed on the body and against the wings. The best and simplest method is to make the center section struts first. Then attach them to the body and lay the completed wing on the top, checking the angle of incidence at this time.

Also, be sure and check the lateral position of the wing in reference to the center-line of the body, so that the wing will not lean down or up on either side. This part should offer no difficulty with the exception of a little patience and time required to check the job.

The lower wing is cemented in place against the fuselage longeron and allowed to dry. Then, the outer struts are fitted in the approximately correct position and their exact position checked. After the corrections have been made so that the fit is perfect, cement them securely against the spars.

COVERING THE MODEL

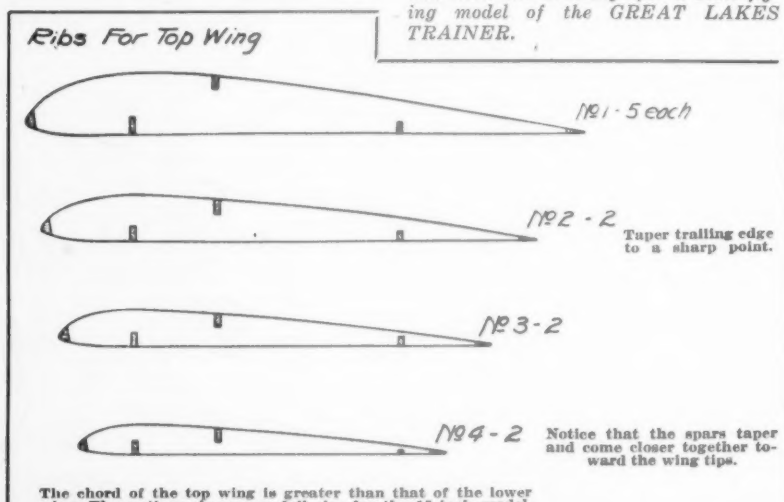
A TWO shade coloring scheme is very attractive and we suggest that this type be copied as illustrated by the photographs. To prevent the paper from drawing up too tight, banana oil should be used when sticking the two shades together. After the two shades are together, each half of the wing is covered so that the red color, or whatever color is preferred, will come to the front side of the wing. Dope should be employed in attaching the tissue to the framework. The under side of both wings is white. The struts, landing gear and nose block are finished off with black lacquer. The wheel pants are silver. Star emblems are used on the top side of the upper wing and on the under side of the lower wing.

THE PROPELLER

A LITTLE difficulty will be encountered in making a three bladed propeller, but if a small hard wood disc is cemented to the rear side, it will help to keep the blades in line—at the same time keep the entire unit rigid. This disc may be an inch and one-half in diameter. Then, after the blades are in place, it may be cut away to conform to a triangular shape, the same shape as the blades when they are cut away. The diameter of the three bladed propeller is nine inches, and the blades should be trimmed down so that ten strands are sufficient to turn over and fly the model at its required speed.

* * *

Editor's Note — Next month, Mr. Ott will show the drawings for a scale flying model of the GREAT LAKES TRAINER.


Ribs For Top Wing
№1 - 5 each
№2 - 2
Taper trailing edge to a sharp point.
№3 - 2
№4 - 2
Notice that the spars taper and come closer together toward the wing tips.

The chord of the top wing is greater than that of the lower wing. The sections shown are full size for the 15-inch model.

The biggest news of the year!

"CLEVELAND MODEL ENGINEERS NEWS"

Just off the press—bursting with news, pictures, model data!

Everybody's reading it—advanced copies have been mailed to our thousands of customers. If you didn't get yours, or if your name isn't on our list, don't wait a second, send today. Though the regular price of this king of model catalogs—the biggest thing ever offered to model airplane builders—is 5c per copy, if you act quick, we'll rush your copy to you for merely a 2c stamp, and name and address—on just a scrap or paper will do. Contact!

Don't Delay — Send for Yours Today

The whole country's talking about the

CURTISS HAWK P.6E

It's a pippin! Doesn't its picture look like the big ship itself? And has it features? Plenty of 'em—including all the newest design advances Cleveland has developed. NOT recommended for beginners—but if you're experienced, don't be without it! ¾ in. scale. Span 23¾ in.; length 16¾ in.; weight 2.9 oz. Flies, zooms, does everything. Colored yellow wings and tail surfaces, everything else green, except black details. Complete Kit SF-21 (everything needed) postfree for only $2.50.

What a GEE-BEE!

This model has brought compliments galore. Even from a famous name (courtesy forbids telling who) in aviation history. Just look at that picture—and then the amazingly low price. We've sold thousands of 'em. ¾ in. scale—and authentic! Span 17½ in.; length 12 in.; weight 1.5 oz. Colored yellow and black. Complete Kit SF-17 (everything needed, including instructions for all lettering not shown in picture) postfree for only $1.50.

Fokker Triplane

Redesigned. The famous plane flown by Germany's greatest ace. Dummy motor (easily made), n'everything. Span 17⅝ in.; length 13¾ in.; weight 1.8 oz. Brilliant red. Complete Kit SF-14, postfree, only $2.50.

Here's the Entire "CEE-DEE" Line of Kits

Authentic ¾ in. Scale

SF- 1: Sport-Trainer...	$2.50	SF-11: The Quad.....	2.50
SF- 2: Mystery Ship...	2.95	SF-12: Nieuport Scout.	2.50
SF- 3: D H 4.....	3.50	SF-13: Spad 13.....	2.50
SF- 4: Curtiss Jenny..	2.95	SF-14: Fokker Triplane	2.50
SF- 5: Laird Solution..	2.50	SF-15: Fokker D-7....	2.50
SF- 6: Polish P.6.....	2.95	SF-16: Albatross D-3..	2.50
SF- 7: C. Helldiver...	3.50	SF-17: Gee-Bee.....	1.50
SF- 8: Boeing P.12....	2.95	SF-19: Supermar S6-B.	2.50
SF- 9: SE-5.....	2.50	SF-20: Hawker Fury...	2.50
SF-10: Sopwith Camel..	2.50	SF-21: Hawk P.6E....	2.50

Authentic ⅝ in. Scale

JSF-1005: High Performance Boeing Bomber..... 2.50

⅝ in. Scale Semi-Profile

FL-301: Amphibion....	$2.50	FL-303: Pirate Bomber	$2.50
FL-302: Trimotor.....	2.50	FL-304: Commodore...	2.50

Large Outdoor Profile

FL-201: C. Robin.....	$1.95	FL-203: C. Bull-Pup	
FL-202: C. Sirius.....	1.95	.....	$1.95

⅝ in. Scale Profiles—All 85c

FL-101: Two Gliders	FL-107: Mystery Ship
FL-102: G L Trainer	FL-108: Boeing Mail
FL-103: Fleetster Mono	FL-109: Curtiss Robin
FL-104: Boeing P-12	FL-110: Vought Corsair
FL-105: Eaglerock Bullet	FL-111: Lockheed Sirius
FL-106: Curtiss Hawk	FL-112: Curtiss Falcon

SF-18: Howard Racer, $1. (Not sold through dealers)

PLEASE go to your dealer's for these kits. If he hasn't them, he'll gladly get them for you QUICK. If he can't accommodate you—order direct.

CLEVELAND MODEL & SUPPLY CO.

Model Engineers Since 1919

1866-PA7 West 57th St. Cleveland, Ohio, U. S. A.

Junior Model

(*Continued from page* 44)

and take all the wrinkles out of the tissue. The stabilizer is built similar to the rudder and the same type of structure should be used on both sides.

LANDING GEAR (BAMBOO—1/32 x 3/32 INCH)

The landing gear is very simple, but should be well cemented to the body. Allow approximately 3/8 inch of the struts to continue along the side so that more cementing surface is secured. Do not attach the landing gear by forcing a very small end into the longeron. This method allows only a small amount of cementing surface and at the same time it weakens the body structure and tends to crack and break the fuselage when receiving landing shock.

WHEEL PANTS (BALSA—1/32 INCH SHEET)

The wheel pants and heavy landing gear tend to bring the center of gravity far forward and allows the wing to be attached nearer the nose than would otherwise be the case. The wheel pants are not essential for flying, but help to complete the finished appearance of the model.

RIBS (BALSA—1/32 INCH SHEET)

The cord of the rib may be the same for the 22½ inch or 24 inch model. To increase the model to twenty-four inches, just increase the span three-quarters of an inch on each wing. Assemble a left and a right wing, round off the leading edge and sandpaper the trailing edge to a very fine wedge shape. The nose ribs are added after the wings have been completed. At the point where the wing braces meet the wing, add a small block of balsa on the outside of the rib, full height.

COVERING (TISSUE—RED AND WHITE WITH BLACK STRIPING)

After the entire model has been built, cover the fuselage entirely with white tissue. The vertical fin, or that part to the front of the upright member, is white and the rudder is red. Use black stripes ⅛ inch wide to offset the two colors. The stabilizer is made in two shades.

Black stripes should be used wherever two colors are used on one unit. The wing is also covered, using red at the front and white on the back. The nose and the wheel pants are painted silver or aluminum. When attaching the wings, do not have a larger angle of incidence than one-eighth inch. Because of the generous camber in the wing section, the model will be found to possess good inherent stability.

The dihedral angle is not very large but the propeller turns slowly, and being of a high pitch, the model travels forward at a fair speed thereby requiring less. The weight of the landing gear and wheels helps to maintain a low center of gravity.

The wings are attached directly to the cross-braces in the fuselage and the front spar should meet an upright at the fourth fuselage station. The small wing braces are necessary to maintain the correct dihedral.

PROPELLER (BALSA—10 INCH DIAMETER—⅝ x ¾ INCH BLOCK)

One size propeller is given which is suitable and will give good duration. However, as each model has different characteristics, such as the total weight, the angle of incidence, and the camber in the wing, it is best to use three or four propellers and find the one that will give the best results.

END

Use this handy coupon for
FREE
CURTISS-WRIGHT HAWK P6E PLANS

Send 5c in stamps to cover mailing cost to

Model Plan Dept., Popular Aviation,
608 So. Dearborn St., Chicago, Ill.

THIS FREE OFFER EXPIRES JULY 10

Name.....

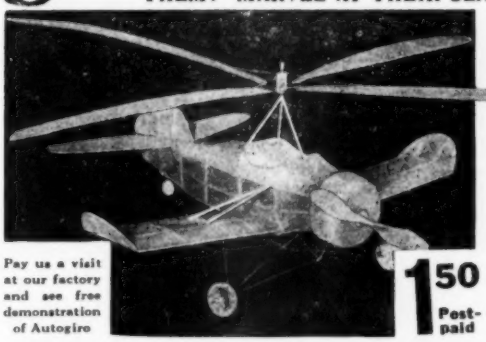
Address.....

City..... State.....

NOTE:—Please confine your letters to requests for plans only.

SCIENTIFIC WINNERS!

BUILD THESE NEW MODELS! GET A NEW THRILL FLYING THEM! MARVEL AT THEIR SENSATIONAL PERFORMANCE!



Pay us a visit at our factory and see free demonstration of Autogiro

FLYING KELLETT AUTOGIRO
2-FOOT ROTOR SPAN

Hundreds of wide awake boys all over the country are now building this Kellett Autogiro—an unusual, perfect flying scale model that every model enthusiast wants and can well afford because of its popular price. It is guaranteed to fly when properly constructed from our copyrighted plans and is indeed a beauty in action. Will fly from 200 to 500 feet. Rotors are NOT powered, but work the same as the original Autogiro, rotating while flying. Complete kit includes full size plans and instructions, with all ribs, wing tips, bulk heads, etc., stamped on sheet balsa, and everything else required to make a complete flying Kellett Autogiro.

1.50 Postpaid

15" FLYING SCALE MODELS

Complete in every detail, including full size plans and detailed instructions. Easy to build. Guaranteed to fly. 99c Each Kit Postpaid

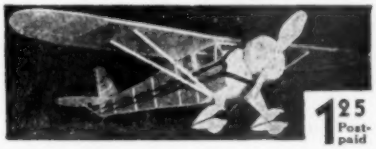
Lockheed Vega

SE5 British Pursuit

Fokker Triplane

Spad Chasseur

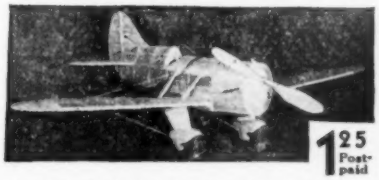
MONOCOUPE-110
2-FOOT WING SPAN



1.25 Postpaid

The famous plane used by Livingston and Omlie in the National Air Race victories. The most complete kit offered today. Contains everything to make a complete Monocouple flying model, including full size plans and all parts clearly printed on balsa. Every boy should have a model of this beautiful plane. Its performance is amazing.

GEE-BEE Sportster D
2-FOOT WING SPAN



1.25 Postpaid

A perfect reproduction of the record-breaking Gee Bee Sportster. It is perfectly balanced, graceful, sturdy and easy to build. We cannot urge you too strongly to buy a Gee Bee kit as it is a model you will be justly proud of. Kit includes full size plans, necessary parts clearly printed on balsa, and everything to complete the model.

! Send for full details about the Scientific contest on July 23, open to all. 14 valuable prizes given !

Model Supplies at World's Lowest Prices

Scientific Balsa
36 in. lengths
1/16 x 1/16.. 1c 8 for 5c
1/16 x 1/8... 1c 7 for 5c
3/32 x 3/32.. 1c 6 for 5c
1/8 x 1/8... 1c 6 for 5c
Sheet Balsa
36 in. lengths
1/32 x 2..4c 1/16 x 3..9c
1/32 x 3..8c 1/8 x 2..6c
1/16 x 2..5c 1/4 x 2..10c
Propeller Blocks
3/8 x 1/2 x 5..... 1c
1/2 x 5/8 x 5.....3 for 5c
5/8 x 1 x 8.....2 for 5c
1 x 1-3/8 x 12..... 9c
Thrust Bearings
.025 and .035 hole each..2c
Acetone
Large 2 oz. can.....10c

Colored Dope
Large 2 oz. can.....12c
Banana Oil
Large 2 oz. can.....10c
Colorless Cement
Large 2 oz. can.....16c
Model Cement
(Amber color)
Large 2 oz. can.....16c
Japanese Tissue
For the commercial ship
Sheet 20½ in. x 24 in... 5c
Scale Model Tissue
Sheet 21 in. x 25 in. 2 for 5c
Double-Geared Winders
Each.....20c
Scientific Rubber
.045 sq., 1/16 flat, 3/32 flat, and 1/8 flat ...3 ft. for 1c

When ordering supplies, add 15c to all orders up to $1.50; above $1.50, add 10%

OUR KITS AND SUPPLIES ARE ON SALE AT LEADING DEPARTMENT AND TOY STORES

Remit by check, postal or express money order

SCIENTIFIC MODEL AIRPLANE CO.
277 HALSEY ST. (DEPT. P7) NEWARK, N. J.

WORLD'S LARGEST MANUFACTURER OF MODEL AIRPLANE KITS AND SUPPLIES EXCLUSIVELY

John Public

(*Continued from page 38*)

to be isolated from that somebody. That's the way it is in the regular run of open cockpit airplanes, but not in the JOHN PUBLIC. No sir! In that super ship both peelot and passenger sit side by side and can get as chummy as they want.

In the second place, when Mr. Average Mann goes for a trip in the ether he doesn't want to start off with a rush and a roar, nor crouch down in a cockpit for a while and then land somewhere. Not if he knows it! He wants to see the countryside he's passing over and he wants to see all of it. Therefore JOHN PUBLIC has just one wing strut on each side. And that means that Mr. A. M. isn't going to find his view obstructed in THAT crate. If, perchance, he has a yen to look through his wings—he just looks through. No bunch of struts and wires says he can't.

Next comes the in-line motor. Now these radial jobs are O. K. for the guy who flies by instinct. But for the fella who wants to see what's in front of him when he's landing—and it may be a nice thick oak tree—the old in-line on JOHN PUBLIC is going to be a little bit of all right. No big bulky cylinders are going to stare him in the face. Just some neat self-effacing streamlining.

Oh yes. You've been wondering what an automobile motor has to do with an airplane. Well lemme elucidate. Time after time some aircraft engine designer has up and explained that when the airplane engine has been in use as long as the automobile engine it will be developed to the point where it is as reliable as the last-named gas-eater.

Oh yeah? But JOHN PUBLIC isn't going to wait for that distant date. He's fitted with a regulation automobile engine—converted—the kind that keeps running as long as there's gas in the tank. And what if that same engine doesn't develop a flock of horsepower. What do we care? So long as it pulls us along at as much as a mile-a-minute clip and does it day in and day out we can see plenty of America from the air.

JOHN PUBLIC needs a little attention. All right. It's not a case of calling out the fire department to get at the motor. Just pull off that removable cowling and the whole motor is exposed. Where's those wrenches?

A little gas is needed for the gentleman resting on the field. The gent is JOHN PUBLIC and it's an easy matter to give him a drink. No stepladders or extra equipment are needed, for JOHN carries his wet goods right under his motor. Just unscrew the cap and pour it in.

We're taking Father for a ride. His rheumatism is troubling him but no need to charter a steam derrick to hoist him into the cockpit. Just open the door (and it's a door worthy of the name) and in he goes.

At last! After all these years of carrying his limbs around in an exposed position, the airplane has a real pair of "pants." Yessir.

END

LOOK FELLOWS NOW ONLY 99 CENTS

Featherweight Motor for Model Airplanes and Boats

Air Motor, kit only, all parts bent, formed and shaped, ready to assemble.....$0.99

Air container kit, wire wrapped, including all parts.....$2.95

10c MODEL PLANE PLANS

Hell Diver, Hawk P-6E, Laird Super Gee Bee, Fokker D-VIII, Bernard, Pfals, Sopwith Camel, S. P. A. D., S. E.-5, Lockheed "Vega" or Orion

Catalog and 1 Plan.....10c

MODEL AVIATOR PRODUCTS
3338 Eastwood Avenue
Dept. 13 Chicago

Dealers Write for Discounts

New Low Prices

Dummy Motors, 1¼ in. diam., 9 cyl., 15c each; 2 in. diam. 25c each; 3 in. diam., 30c each. Cowlings, 22c each. Pants, large for 1¾ in. wheel, 28c pair; Small, for ¾ in. and 1 in. wheel, 15c pair. Celluloid Wheels, ¾ in. diam., 2 pair 9c; 1 in. diam., 7c pair; 1¼ in. diam., 9c pair; 1¾ in. diam., 13c pair; 3¼ in. diam., 28c pr.

Celluloid Cement, 2 oz. can, 11c; 1 pt., 75c.

Jap tissue, 3 sheets 7c—(Red, white, blue, orange, green, brown). Black Tissue, 20x30, 5c each.

Music Spring Wire No. 4, 5, 6, 8, 10, 12, 14, 16, 18, 10 ft. rolls only, 3c each.

Para Rubber: A new fresh stock 1/32 sq., 50 ft. 7c; 3/64 flat, 50 ft. 11c; 1/16 flat, 50 ft. 15c; 1/8 flat, 50 ft. 16c; 3/16 flat 50 ft. 20c; 1 skein 86c.

Scrap Kits $1.00 value, 25c; 3 for 50c.

SUPER "A" GRADE BALSA WOOD
20 in. lengths only

1/64 x 2.....5 for 9c		1/32 x 1/16....16 for 5c	
1/32 x 2.....5 for 9c		1/16 x 1/16....16 for 5c	
1/20 x 2.....5 for 9c		1/16 x 1/8.....16 for 5c	
1/16 x 2.....5 for 9c		1/8 x 1/8.....16 for 5c	
3/32 x 2.....4 for 9c		1/8 x 1/4.....16 for 12c	
1/8 x 2.....4 for 13c		1/4 x 1/2.....1 for 2c	
3/16 x 2.....2 for 11c		1/2 x 1/2.....1 for 4c	
1/4 x 2.....2 for 13c		1/2 x 1.....1 for 7c	
2 x 3 x 20.....1 for 25c		2 x 3 x 40.....1 for 45c	

FREE! All orders received before July 31st sent postage free anywhere in U. S.

IMPORTANT ORDERING INSTRUCTIONS

Add 15c packing and postage charge to all orders. Send 2c stamp for price list. Dealers and Clubs write for discounts.

WOBURN MODEL AIRPLANE SHOP
17 Belmont St. (Dept. P-7) Woburn, Mass.

Daredevil Pilots

(*Continued from page 36*)

them, finally got to a highway, "borrowed" a trapper's car, came to a town, and long distanced his boss. His morale was unimpaired.

Such instances are the stuff of which adventure stories are made, but they are growing fewer in the air service. There are a number of influences at work to make pilots as routine bound as bus drivers.

While adventure comes occasionally, as in all walks of life, yet they are the exception rather than the rule.

One of these influences is professional training. "When I came into commercial flying," says a veteran pilot of five years' service, "I came from the forest patrol. I went to no school of aeronautics. Nobody did then. Pete Morse came to our company about the time I did. He was what he calls 'a grease monkey' in a garage, somehow learned to fly and was earning a so-called living, barnstorming. His wife has told me they were often down to a quarter in those days. He had never heard of the theory of flying when he got a job as a commercial pilot. Today he has more actual flying hours to his credit than almost any pilot in the United States."

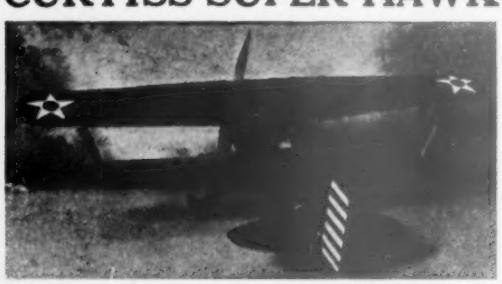
HIS kind are getting rare nowadays. Pilots come out of schools, where they have had complete technical training. They begin as co-pilots on tri-motor planes and work up, just as men do on railroads or steamships.

"Once these young professionals establish themselves, they are sure of jobs, if they behave. In the old days on some lines," the pilot reminisced, "pilots were adventurers because they were never sure of their jobs. On one large line, every field manager was a petty, independent czar. Pilot-firing was daily routine. If a pilot came in a few minutes late or the field manager had been up many minutes late the night before, a pilot was fired. Now this has been changed. On all the larger transport lines now, I believe, only the operating manager or some one official has authority to hire and fire pilots.

"We are getting used to our income now, too, and settling down. Most of the pilots of my time had never seen any real money before they began commercial flying. Then we began getting $150 a month base pay, for instance, with an additional four, five, seven or nine cents a mile for flying time.

"You want to know why the difference in rates? Well, night flying is better paid than day, as it is more dangerous. For instance, night flying over certain parts of the Sierras would rate nine cents. The money piles up fast. First thing you know there is $1,000 in the bank. You go out and get a big meal, then you buy an eight cylinder car and a diamond bracelet for the wife and maybe you know that

CURTISS SUPER HAWK



2-FOOT FLYING SCALE MODEL
Construction Set
$1.00

The most sensational value in model sets, including all materials, insignias, glue and full size drawings. Model flies over 1 minute. Travelair, 24-in., Const. Set. $2.50
S. E. A. 5, 15-in. Const. Set, 1.00
S. E. A. 5, 30-in. Const. Set, 3.50
Boeing P-12, 48-in. Const. Set, 13.95
Send 10c for illustrated Catalog, showing 1-in. to 6-in. models.
6 Cylinder 1/6 H. P. Air Motor, Ready to Run, $12.50.
4 Cylinder ¼ H. P. Air Motor, Ready to Run, $6.75.
30 pictures of latest type airplanes, fighters, etc., 50c.
MINIATURE AIRCRAFT CORP.
83 Low Terrace, New Brighton, N. Y.

one of our old pilots has a house, a nice one, at either end of his run."

Pete Morse, the former "grease monkey", is the owner of one of the most expensive cars made, equipped with every possible gadget the car will take. He has just bought a radio for it, and his wife says she hopes the radio will drown out the other expensive noises she is always hearing.

"I told him he had no business buying that car—times are changing for pilots. He said, 'George, I can remember a time when I was lying on my back under just such a car with the grease trickling down my nose. I said to myself; I am going to own one of you some day. Now I do, and I am not sorry, whatever happens'."

WELL, there is the old time pilot for you, but most of us are getting more cautious and the new ones, the boys who paid high tuition at schools of flying, are different. I talked to a number of them recently on a trip over an Eastern line. They have savings accounts, live in modest homes, drive medium priced cars. They are sober professionals, not figures of romance.

Although this pilot did not mention them, the safety policies of the large transport companies are no doubt responsible for many of the changes he notices. Publicity men for airlines used to feature the romance, the adventure, the thrills of flying. All that is taboo now. One line, for instance, calls itself the "Main Street of the Air", a title carefully chosen because of its humdrum associations, designed to teach the public that flying is an everyday affair.

It is hard to imagine a figure of romance, departing and arriving according to printed schedule at a brick passenger station where chewing gum and magazines are sold. And he doesn't. Stunt flying, steep banks, and side slips are strictly forbidden to transport pilots. These antics are out of place on the staid "Main Streets" of the air.

And the new pilot must not only be safe, he must be dignified, as aloof in his cockpit as a locomotive engineer in his cab. Typical regulations provide: "Pilots will not board and leave planes by the passenger entrances and exits. They will not linger in passengers' cabins while in flight".

Nor are they allowed to carry armfuls of helmets, boots and flying coats through cabins or store them there, while small boys look on adoringly. These natty pilots will step into their cockpits by the "employees' entrance" —and romance will be dead.

But there is another side to the picture. Aunt Maria, hastening by air to bring comfort to a brother who needs her, does not crave thrills. She is glad to be piloted by a safe, sane, sober young man, on duty at all times in the cockpit, and pledged to refrain from stunting, side slipping and steep banking. And Aunt Maria pays her way. For her sake, pilots are rapidly becoming prosaic professionals.

We arm chair aviators will have to swallow our disappointment and look for new worlds of romance.

END

Testing

(*Continued from page 40*)

So equipped, the plane is taken into the air and flown around at low altitude until the engine is properly regulated and warmed up.

The machine is then brought close to the ground, the desired initial climbing speed is attained, the throttle is pushed wide open and the stop watch started. From then on, the pilot flies at an absolutely steady speed, varied only slightly with change of altitude, and records the readings of his various instruments at fixed time intervals. This is continued until the indicated rate of climb is approximately that of service ceiling (100 feet per minute) at which point the climb is stopped.

While descent is being made to the ground, data is taken by the pilot while making full power runs at frequent altitude intervals to determine the maximum indicated speeds at each of these altitudes. The statoscope, which indicates the very smallest change of altitude, insures that the plane is neither climbing nor gliding when these latter observations are made.

A climb to the higher altitudes, such as is common for the small high-powered fighting planes, is a complicated operation. The pilot is bun-

(*Continued on next page*)

Howard Racer . . . $1

Today's best value in model kits—a Cleveland-Designed authentic ¾ in. scale flying model at a price that enables everyone to "get acquainted" with "Cee-Dee" superiority. Ben Howard's Chicago race winner. Colored with Cleveland's new glistening white model dope. Span 15 in.; length 13¼ in.; weight 1.3 oz. Complete Kit SF-18 (everything needed) postfree, only $1.00. Don't delay—send NOW.

See our ad on Page 80

CLEVELAND MODEL & SUPPLY CO.
1866-PA7 West 57th St. Cleveland, Ohio

PROPELLERS

Patented

ALUMINUM ADJUSTABLE PITCH
Most efficient and practical.
Reversible for either right or left.
Use on twin pusher racing models.
Adjustable to any pitch. Get maximum power with minimum rubber.

TWO BLADED
8" dia., 35c 10" dia., 50c
Shaft bearing and hanger complete, 20c

THREE BLADED—Complete with shaft
8" dia., 85c. 10" dia., $1.00
Packing and postage 3c each

DIE CAST PROPELLERS

STANDARD STEEL TYPE
With bushing and shaft complete.

3¼" dia	20c	5" dia	30c
4" dia	25c	5½" dia	30c
4½" dia	25c	6" dia	35c
		6¾" dia	50c

DIE CAST 3 BLADED

4" dia	30c
4½" dia	40c
5" dia	50c

Packing and postage 3c each

HAWK TYPE
Die-cast with Spinner Hub.
Bushing and shaft complete.
3¼" dia 25c
6¼" dia 40c

SCALE MODEL MOTORS DIE CAST
1½", 7 Cylinder, illustrated, with Prop 50c
1" 9 Cylinder Motor (alone) 30c

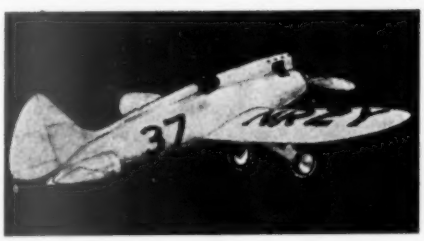
DUMMY MACHINE GUNS
Pursuit Type 10c
Swivel Type 25c

Postage on any above items, 3c each
Send 10c for Complete Catalog.
1000 different parts listed and illustrated.

SELLEY MFG. CO., Inc.
1373 P. Gates Ave., Brooklyn, N. Y.

PIONEER MODELS

Complete Line of Scale Models, Scientific Models, and Supplies



Send 5c Coin For Catalog P-7

Benny Howard's Famous Racer — A Kit for $1.50

As in all Pioneer kit models, this one not only faithfully reproduces the fastest 90 horse power airplane in the world, but makes a model of exceptional flying qualities and duration. Wing span 22 in., wt. ¾ oz., duration 87 seconds. This model has won more big-city flying scale model contests than any model we have heard of—Celluloid wheels, all metal parts formed, full size layouts and instructions, all material cut to dimension propeller "blanked" out. Easy to build and easy to fly. Kit postpaid.....$1.50

Send 5c Coin for new catalog P-7, of famous kits and supplies

Pioneer Model Airplane Supply Co. :: Champaign, Ill.

dled up like an Arctic explorer, with a heavy fur suit and boots. A mask covers his entire face and he wears heavy gloves of leather and fur. With a ground temperature of perhaps 100 degrees F., the early part of the run is far from being comfortable. The air soon cools, however, and the pilot's body begins to feel normal.

A new complication, however, now enters for the air gets thin. Oxygen from the pilots tank is turned on for normal flow when the plane is about 18,000 feet up. The outlet, in the form of a pipe stem, is held between the teeth. From then on, the problem is of major operation, for the pilot must accomplish the following operations continuously:

First, watch and keep the oxygen flow such as to insure enough air to sustain normal physical functions; Second, operate the mixture control of the engine to maintain the maximum engine power and to fly at exactly the prescribed speed for the indicated altitude; Third, constantly observe all instruments; and every two minutes—absolutely on time—record the indications of not less than seven instruments. The pilot performs these operations in a temperature which is probably close to 40 degrees below zero.

Strictly speaking, climb and speed trials should terminate performance tests. But there also remain flights to determine the stability and balance of the plane, and all maneuvers (acrobatics) expected of the type must be tried out. And finally the guns must be fired while the ship is in the air, the bombing installation must be tested, the radio installation tried in flight, and all miscellaneous equipment and appliances actually operated to establish their suitability for service use.

The foregoing constitutes the normal full performance trials of a new airplane. In addition, however, almost every plane has further trials before it can be accepted for service use. The small seaplanes, designed for employment on the catapults of battleships and cruisers, are tested by flight test pilots on a catapult at the Navy Yard, Washington, D. C.

Carrier planes are transferred to the experimental division at the Naval Air Station, Hampton Roads, for arresting gear tests at that station. Seaplanes generally, including the big flying boats, are given rough water tests at the latter station. Thus, a plane which has completed its flight trials has actually gone through everything that it can normally be called to do in service.

The test pilot is far from finished with his work when he lands and taxies to the line. First, he must write a report after every flight, covering the work that he has accomplished in the air. Then his data, together with the recorded results of the flight, must be put into standard form, "reduced to standard conditions."

Finally, all test pilots must inspect every airplane in the greatest detail in order to recommend the changes and modifications they consider necessary or desirable to best fit the plane for service use. These recommendations, together with the results of the flight trials, are the basis of a formal report on which the Navy Department determines its action with respect to any particular type of airplane.

The Flight Test Section at Anacostia at present consists of five officers, two aeronautical engineers, three clerks, and twenty enlisted personnel. Lieutenant Ralph A. Ofstie is officer-in-charge of flight tests.

END

Questions and Answers

(*Continued from page* 33)

QUESTION:—Harry Lichtner, Sioux City, Ia. *I am in a jam with the inspectors because of the propeller clearance on my lightplane. When the ship is standing horizontally in its normal flight position, the clearance under the propeller is 7 inches. He claims that this clearance should be 9 inches with the shock absorbers fully deflected. Is this correct, according to the U. S. regulations?*

ANSWER:—YES, it is true. The inspector wins—as usual.

* * *

QUESTION:—A. C. Velie, Nashville, Tenn. *I understand that the government requires a special kind of hook for attaching the tow rope or launching elastic. Please give me the requirements.*

ANSWER:—THIS hook must be so designed that the towing cable can be released at the will of the pilot. The hook, or its attachments, must also be arranged so that it will fail and release the towing cable when the load on it is equal to or less than half of the greatest wing structure design load, provided that the strength at this point shall not be less than one-fifth the wing structure design load. And so you see, this is another place where that stress analysis stuff gets in its deadly work.

* * *

QUESTION:—G. A. Asbury, Lexington, Ky. *What sort of rivets are used in fastening the skin of metal covered airplanes to the framework? Will copper or steel rivets answer?*

ANSWER:—SPECIAL aluminum alloy rivets, heat-treated, are required by the U. S. Department of Commerce. Copper or steel rivets would not and should not be permitted because they would set up electrolytic couples in the metal sheets that would soon destroy the metal. Copper or steel in contact with aluminum, act like the elements of an electric battery and produce destructive currents.

* * *

QUESTION:—Al. Frazer, Harrisburg, Pa. *How are the propeller blades driven*

Selley **FLYING MODEL PARTS**

ALUMINUM N.A.C.A. COWLS

	Drag Ring	Open Cowl	Closed Cowl
1½"	20c	20c	20c
2"	25c	25c	25c
2½"	28c	30c	30c
3"	30c	35c	35c
3½"	40c	45c	45c
4"	50c	55c	55c

Packing and postage on cowls 6c each

SEPARATE CELLULOID CYLINDERS

Make your own motors with these.

¾"x¾"x¼"...3c ea. Cyl.
1"x1"x½"...4c ea. Cyl.
1½"x1½"x½"...5c ea. Cyl.
Postage, 3c doz.

9 CYLINDER MOTORS

1½" dia. Motor.....20c
With cowl plate.....25c
2" dia. Motor.....25c
3" dia. Motor.....30c

SPECIAL COWL PLATE

Very realistic, with 9 elongated slots, complete with bearing bushing, fits 3" motor.....13c

Postage on any above items, 3c each

CELLULOID WHEELS

¾" dia.	6c pair
1" dia.	8c pair
1½" dia.	10c pair
1¾" dia.	16c pair
3" dia.	40c pair

Postage, 3c pair

CELLULOID PANTS

Pants for ¾" or 1" wheels, per pair.....25c
Pants for 1½" or 1¾".....30c
Pants with ¾" wheels attached, per pair.....40c
Pants with 1" wheels attached, per pair.....40c
Pants with 1½" wheels attached.....50c
Pants with 1¾" wheels attached.....50c
Postage, 3c pair

CELLULOID COWL

2" dia. x 1½" deep.....20c
2½" dia. x 1½" deep.....20c
Packing and Postage, 6c each

SEND 10c for complete catalog.
1000 different parts listed and illustrated.

SELLEY MFG. CO., Inc.

1373 P Gates Ave., Brooklyn, N. Y.

SUPPLIES AT LOWEST CUT PRICES

SUPER QUALITY BALSA WOOD (20" lengths)

1/16 x 1/16	20 for .05
1/16 x 3/32	20 for .05
1/16 x 1/8	20 for .05
3/32 x 3/32	20 for .05
1/8 x 1/8	20 for .05
1/8 x 3/16	20 for .09
1/8 x 1/4	20 for .13
3/16 x 3/16	20 for .13
3/16 x 1/16	20 for .16
1/4 x 1/4	20 for .17
1/4 x 1/2	3 for .05
5/16 x 5/16	3 for .05
1/2 x 1/2	3 for .10
1/2 x 1	1 for .06
1x1	1 for .11
1x2	1 for .20
2x2	1 for .30
2x3	1 for .40
2x6	1 for .60
3x3	1 for .50

SHEET BALSA (20" lengths)

1/64 x 2	5 for .08
1/32 x 2	5 for .08
1/20 x 2	5 for .08
1/16 x 2	5 for .08
3/32 x 2	4 for .08
1/8 x 2	4 for .12
3/16 x 2	2 for .10
1/4 x 2	2 for .11

PROP BLOCKS

1/2 x 3/8 x 5	2 for .01
1/2 x 3/4 x 5	dozen .10
1/2 x 3/4 x 6	dozen .11
5/8 x 1 x 7	dozen .15
5/8 x 1 x 8	3 for .05
3/4 x 1½ x 9	3 for .05
3/4 x 1½ x 10	2 for .05
3/4 x 1½ x 11	1 for .04
7/8 x 1½ x 12	1 for .05
7/8 x 1½ x 16	1 for .09

PLANKS

2 x 3 x 36	.45
1 x 6 x 36	.40
2 x 6 x 36	.80

Sheet Aluminum (12" wide), .002, per ft., .12; .005, per ft., .11; .010, per ft., .13; Washers, large or small, 2 dos., .03; Eyelets, 3 dos., .10; Double Geared Winders, each, .25; Sandpaper, 1 dos. sheets, .10; Reed, 1/32" diam., 3/64" diam. or 1/16" diam., 6 ft., .03; 1/8" diam., 9 ft., .05; Bamboo, 1/16x12, dos., .05; 1/16x15, dos., .07; Airplane Insignia—stars in circle or bulls-eye (red, white, blue)—1" diam., 8 for .05; 1½", 7 for .05; 2½", 6 for .05; Celluloid Wheels in all colors, 3/4", per pr., .04; 1", per pr., .06; 1¼", per pr., .08; 1½", per pr., .12; 2", per pr., .25; Aluminum Tubing, 1/16" O. D., per ft., .05; ⅛" O. D., per ft., .05; 3/16" O. D., per ft., .08; Dummy Motors—9 Cylinder, 1½" diam., each., .16; 2" diam., each, 23c; 3" diam., each, .29; Black Celluloid Pants, pair, .25; Small Pants, 1¼" long, for 1" and ¾" wheels, pair, .14; Black Celluloid Cowlings, each, .20; Colored Dope: Colors: Orange, Red, Green, Silver, Yellow, Blue, Black, White, Buff, Navy Grey, Mahogany, Olive Drab, 1 oz. bottle, .06; 2 oz. can, .09; pint can, .65; Colorless Cement, 1 oz. bottle, .06; 2 oz. can, .09; pint can, .65; Thrust Bearing, small and large sizes, each, .01½; per dos., .15; Clear Dope, 2 oz., .07, pt., .37; Banana Oil, 2 oz., .07, pt., .37; Acetone, 2 oz., .06, pt., .35; Para Rubber—no rubber is over 5 weeks old—1/16 flat, 50 ft., .12; 225 ft., .50; ¼ flat, 50 ft., .13; 225 ft., .55; 3/16 flat, 50 ft., .17; 225 ft., .75; Japanese Tissue—Red, Blue, Green, White, Orange, Brown, and Yellow—5 sheets, .10; Music Spring Wire, .014, .020, .028, .034, 18 ft., .05.

Include 15 cents to all orders up to $1.50. Orders of $1.51 and over, add 10% for packing and postage. Orders West of Mississippi, and Canada, add 10 cents extra.

STAR MODEL AERO SHOP, 10-12 Pearl St., Newark, N.J

in an autogiro, that is, the blades of the propeller or windmill that lifts the ship? Are they driven by the engine?

ANSWER:—WHEN the autogiro is resting on the ground or taking off, the rotor is driven by the engine through gearing. When in flight, the engine is disconnected by a clutch and the rotor is then driven by the airstream.

* * *

QUESTION:—John Herrick, Phoenix, Ariz. *What is the greatest load allowed on a high pressure airplane tire measuring 10x3 inches. What is the inflation pressure?*

ANSWER:—THE maximum load permitted on a 10x3 high pressure tire is 400 pounds and the inflation pressure is 55 pounds per square inch.

* * *

QUESTION:—D. S. Livingston, Roanoke, Va. *Why do carburetors for airplane engines cost so much more than the automobile engine carburetors? I saw one of the airplane carburetors quoted at $300.00.*

ANSWER:—FOR one thing, the airplane engine carbureters are considerably larger than those used on automobile engines. Second, they are not in volume production to the same scale as the automobile carbureters and they are considerably more expensive when made in small quantities. There is no doubt but what the prices charged for aeronautic accessories seem outrageous, but at the same time we must remember that these parts are not passed over the counter as rapidly as auto parts.

* * *

QUESTION:—L. M. Koehler, Birmingham, Ala. *How do the wings of an airplane support the ship when it is flying upside down? From the diagram that I have seen, it would seem that the wings would shove the airplane down instead of holding it suspended in the air.*

ANSWER:—AN INVERTED wing will give some lift when held at the proper angle with the airstream and at the proper velocity. However, this lift is very much less than with the wings in their normal position, and they require a considerably greater amount of power and speed. It takes a high powered ship to hold a constant altitude when flying inverted because a higher speed is required to gain the required lift. Army pursuit ships can hold their own or even climb, but this is not the case with ordinary ships equipped with a small power plant.

SPECIALS

1/32x2x36" balsa,	7 for 25c	Hakone tissue — Red,	
1/16x2x36" balsa,	7 for 25c	White, Blue, Brown, Green	
1/8x2x36" balsa,	5 for 25c	and Orange 4 sheets for	10c
2x4x36" balsa,	45c	1/32 sq. rubber	75' 10c
2x6x36" balsa,	75c	3/64 sq. rubber	50' 10c
3/8x1/2x5" balsa,	8 for 5c	3/32 flat rubber	40' 10c
1/2x3/4x5" balsa,	7 for 5c	1/8 flat rubber	35' 10c

Add 10c postage. Discount to Dealers and Clubs
Send 2c stamp for price list

DALLAIRE MODEL AIRCRAFT CO.
10140 Crocuslawn Ave. Detroit, Michigan

QUESTION:—Joseph Schmaltz, Clear Lake, S. D. *Can an airplane fly backwards? I have heard that this has been done but I fail to see just how. Please explain.*

ANSWER:—WHEN the ship is headed into a wind that is blowing faster than the speed of the ship, the ship will move backward in relation to the ground. However, its air speed or speed in regard to the air remains the same as before. For example, if a ship with a speed of 60 m.p.h. is flying against a 60 m.p.h. wind, then the ship will hover apparently motionless over the earth. If the wind should now increase to 80 m.p.h., with the ship speed as before, then the ship will move backwards over the earth at the rate of 20 m.p.h.

END

Stratosphere

(*Continued from page* 31)

As the plane gradually rises through the atmosphere, into strata of constantly decreasing density and as its speed gradually increases, the pitch of the propeller is progressively changed to higher angles. Finally, when the machine has reached its designed altitude for flat travel, the blades will have been set to an angle where they offer minimum resistance to the forward progress of the plane.

At this angle, the jet-propulsors are pointed almost directly astern and act as simple rockets, the screw-propeller being held stationary or allowed to rotate at greatly reduced speed. In this way, we attain a gradual or continuous transition from simple propeller action to direct jet action, and with no serious departure from usual design aside from what is inseparable from the use of jet-propulsion methods.

AS SHOWN in the drawing, the reaction-driven propeller is of large diameter to adapt it to efficient operation at extreme altitudes, it being mounted considerably above the axis of the ship to provide proper ground clearance for starting or landing.

To make steering certain, even at the highest altitudes, a universally mounted auxiliary jet propulsor, is actuated in its pivotal motions by the usual steering apparatus and hence moves in unison with the vertical and horizontal rudders.

It need hardly be stated that this auxiliary propulsor would also add to the driving effort applied to the plane, and might be brought into requisition for this purpose alone as soon as altitude and speed conditions warranted its use.

Of course, there is an objection to both of these embodiments of Doctor Goddard's suggestion for driving the propeller, as opposed to the use of a gasoline engine, in that both call for the storage of oxygen aboard the ship for the purpose of forming a combustible mixture.

In the case of a gasoline motor, this oxygen is taken directly from the air with a very considerable saving of weight. There is, moreover, to be considered the practical fact that at the present date the fuel injection reaction motor for continuous duty is still entirely a matter of theory or of tentative experimentation.

Foremost among the questions, yet to be solved, are those of providing a combustion chamber and nozzle that will withstand the tremendous eroding action of the exceedingly hot and highly compressed combustion gases, the provision of a satisfactory combustible mixture, and (though this is rather a matter of mechanical design) a practicable pump and accessory apparatus to convey this mixture at a controlled rate to the combustion chamber.

END

BUILD THESE FAMOUS WARTIME SHIPS
These models are exact copies of the real ships and sensational performers. Kits contain stamped parts, formed wire parts, READY-CARVED PROPS, insignia, full-size plans, etc. Most complete on the market. Wingspans—13 to 15 inches. All in proportion with each other. Kit for "NIEUPORT SCOUT" (above), "SOPWITH CAMEL," "S.E.5," or "FOKKER D-7" ..... $1.25 Each Postpaid

Full-Size Plans for Above Ships—25c Each

Kit for the famous "JENNY" Wartime trainer, Wingspan 19 inches ..... $1.75 Postpaid

Remit by Money Order Only. No C.O.D.'s
5c Coin Brings Illustrated Price List

SKI-HI MODEL AIRCRAFTERS
Sunrise Gardens, Lynbrook, L. I., N. Y.

Most Easily-Built Models on the Market

Unlike expensive models, which only experts can build well enough to fly, these 12-in. Midland designs can be constructed in an evening without tools, without skill. They are light, sturdy, realistic. They will rise from the ground by their own power and fly 150 ft. or more—farther than many models advertised to fly much longer distances. They are less easily damaged, easier to repair, adjust and fly, and more satisfactory. More fun, less trouble. Both sets include aluminum propeller (11% more efficient than any other tested), special rubber band motor, stream-lined wheels, lathe-turned nose-block, ready-cut struts, etc., with full building and flying directions. Either set, postpaid in U. S., only 50c. Canada 50c. Am. money. 65c Can. funds. Order one or both today. (We do not fill C. O. D. orders. No catalogue. Send check or money order, not stamps.)

British Sopwith single-seater fighter. A fast, beautiful, exceptionally steady model

Morane-Saulnier 238C1, fastest modern French pursuit ship. An interesting, unusual, high-speed model

MIDLAND MODEL WORKS
Dept. V, Chillicothe, Ohio

Builders Like These Models!

Enclosed is my check for $1.50, for which send me three models of your British Sopwith, like those I purchased a month ago. These models certainly can fly, and they stand the hard bumps. *Paul R. Atherton, Binghamton, N. Y.*

Enclosed find my check for $1.50 for which send me three more models of your Sopwith Pursuit plane. I would appreciate your informing me if you have any other models. *Paul R. Atherton, Binghamton, N. Y.*

The monoplane is a dandy model. The weather has been too bad to fly it out doors, but it flies dandy in the house. It's the only 50c model I ever saw that's any good. The aluminum prop sure is neat. *Ben Bodine, Woodbourne, Pa.*

The model sure flies good indoors and out. It makes a three point landing. Please send me 6 landing wheels. I find the wheels so good that I equip stick r. o. g. model with them. *Ben Bodine, Woodbourne, Pa.*

Mechanic's Exam

(*Continued from page 39*)

sible, a short stub of 4 or 5 diameters at each joint or station point. If such stubs cannot be left, then the entire longeron must be removed.

In the former case, where a stub is left, the replacement tube should be larger in diameter than the original tube so that it can be slipped over the stubs. A fishmouth is cut on the end of the replacement tube, welded in such a position that the inserted piece extends at least one diameter beyond the bottom of the fishmouth cut.

Q. Why should all wires be neither too tight nor too loose?

A. If the wires are too tight, then an excessive stress will be brought on the wires when loaded. If too loose, violent shocks may be brought on the structure or vibration may result.

Q. What would you do to re-rig a monoplane that had a tendency to turn to the left?

A. Reduce the angle of incidence on the left wing; increase it on the right wing; readjust vertical fin.

Q. What are the advantages of balanced control surfaces?

A. They are easier to operate in flight and reduce the stress on the control members.

Q. What causes tail flutter?

A. Slack control wires, loose hinges and connections, improperly adjusted fixed control surfaces, loose braces.

Q. What is the purpose of decalage?

A. To improve the longitudinal stability.

Q. Why is it important that the center section wires be of proper tension on an open biplane?

A. If they are not of the proper tension, the wings will be out of alignment.

Q. How can an "I" beam wing spar be repaired in which the cracks are longitudinal?

A. Strips of spruce or plywood can be glued to both sides of the spar, the strips being of sufficient thickness to develop the original shear strength of the spar. The strips shall extend beyond the termination of the cracks.

Q. What parts of the landing gear can be repaired by a repair agency?

A. Any parts that require little working, but no parts that require heat-treatment.

Q. If one-third the ribs in a wing panel are replaced, is this a major repair?

A. No.

Q. What sort of stitching is to be used on fabric covering?

A. Double stitching is recommended.

END

Flying Game

(*Continued from page 24*)

time. I have seen many mechanics with Federal licenses get turned down. There are plenty of engine mechanics on the market, doing nothing.

I once saw two mechanics at different times come into transport companies' offices and apply for work. It was to me a sad sight, because these men, especially one, were surely full of ambition. However, they happened to run into a hard-boiled superintendent or field manager that spoke in a sharp tone of voice, "Well, what can I do for you, young man?" "I am looking for a mechanic's job, sir." "Well, I don't know if I can use you. Where did you work last?" the superintendent asked. The mechanic answered, "I have just finished my course of a mechanic with so and so school. I took a six months' course and finished high. I have my diploma here. See, here it is, signed by the chief instructor, and my rating is ninety-seven.

"Yes, sir, I surely earned this diploma. The water-cooled engines I worked on were wrecks when I started, but they ran perfect when I got finished. I also have a letter here from the president of the school, which speaks for itself. I guess I have told you all I can, and if you will communicate with my school instructor he will tell you, I'm sure, that I can handle the job."

I have never seen such a surprised superintendent. I thought he was going to jump out of his hide. He answered the mechanic, "Listen, young man, you are quite a salesman. You missed your calling, and I advise you to take that diploma back to that flying school and see if you can sell it back to them for the same money you paid for it. Also pick up a handy flunky job somewhere for a year and then come back and see me with a Federal license and perhaps I can use you then."

At this point the superintendent walked off and told the information girl to be careful about who she sent into his office. The poor student mechanic walked out the door in a trance. I surely felt sorry for him, as he had the makings of a fine man. I hope by this time he has succeeded and realized that there are many others in the same boat.

Just another bitterly disappointed man who had spent his time and money in vain.

I found out afterwards from the Superintendent that the diploma was issued from some little jerk water school. "How do you know it was a jerk water school?" I asked. "Well, that's easy," he said. "See this little book. The schools we recognize are in here, and if he had received his training with any one of these schools I would have given him a chance. If he comes back again, in six months, I'll hire him. He is not the only one that comes in here with one of those bright colored diplomas. The smaller the school, the larger the diploma."

To me at first it seemed impossible how these transport companies get the low-down on their men, but they do. The transport companies lay down their standards and, believe me, one has to follow them. All these companies have to do is get in touch with the Department of Commerce and they get the low-down on every pilot or mechanic from the rear ranks on up. Also airports and aviation schools. So never go to a mail or passenger service line thinking you are going to put one over, because you will be the one that will suffer. If you are a mechanic without a license or a pilot with less than seven hundred and fifty hours stay away, unless you have some inside influence.

END

Chute Jumper

(*Continued from page 12*)

Richey jumped from the cockpit, expecting to find me ready for the ambulance. Finding that the only damage was a ripped shirt and a scratched back, he helped me get untangled. And while the mechanic got the motor to hitting again, I cleaned the dirt from my pants and we repacked the chute.

This time, he suggested that I try the front cockpit, and that if I could manage to walk back along the ladder as far as his cockpit, he could pull the knot while I held on with both hands to the side. I agreed.

I tied the bag to the steel ladder with a five-foot rope, squeezed into the front cockpit and he once more took off. Several minutes later we were circling at 2800 feet altiude. Never will I forget the terrible sickening sensation in the pit of my stomach when Richey cut the gun and yelled for me to start back.

All the way up I had been thinking of what had happened a few minutes before. I called myself several different kinds of fools for ever thinking that I wanted to make a parachute jump—much less make one with a second hand parachute that I wasn't sure would work at all.

I squeezed out of the cockpit and gingerly made my way backward along the ladder until I stood beside the rear cockpit. Taking the stick in his right hand, Richey reached over the side, grasped the knot and yelled:

"Ready?"

"Let her go!" I yelled back.

He gave the knot a jerk, but it failed to slip. However, he couldn't see that.

"GO ON OFF!" he roared.

"Give it another jerk!" I hollered. He did—and hit me in the chest with the back of his hand knocking me off backward into space. He didn't want that 'chute to fly back in to the tail group and kill both of us.

SOME of the jumps that I have made and witnessed, were tinged with a slight touch of humor. I remember the

first jump I ever made from an OX5 Jenny. The front cockpit was so small, and the upper wing so close above it, that the only way I could get in with the bag was to hold on to the center struts, boost myself in feet first and then pull the bag in on top of me. Imagine my surprise and disgust, a few minutes later, when I found that I couldn't get out over the side.

I finally boosted the bag up out of the cockpit and slid out backward far enough to get my head from under the trailing edge of the upper wing. Then I began to wiggle backward along the top of the fuselage until I could get one leg out and around one of the struts behind the cockpit.

Holding on to a strut, I got one leg down on the wing walk, but the other one got caught behind the seat and I couldn't get it loose.

When Richey saw what the trouble was, he turned the stick loose while standing up in the cockpit, reached over and got a firm two-handed grip on my boot. He began to heave. While the old Jenny wobbled all over the field, I hung on and he pulled on the boot.

When it did come loose, it did so with such suddenness that he sat down with a thump and nearly heaved me off the wing. To finish the day, I nearly fell out of the sling when I jumped out. The next day I had a regular set of web-harness made.

THE worst scare that I ever saw any jumper get, happened at a town in Arizona. Some fellow, who styled himself "Daredevil" ———, came out to the field and talked the manager into letting him jump in my place the following Sunday.

Because he owned a brand new Irving back-pack, and promised to make a long delayed drop, the boss let him do it for—delayed drops were not as common then as they are now. During the next few days "Daredevil" didn't lose any opportunity to tell the boys how good he was, and when Sunday arrived he was, to put it roughly, all cocked and primed.

The jump had been so widely advertised that we had an enormous crowd of people out to the field that day, and three of them even paid five dollars apiece for the privilege of riding up with him in the front cockpit of the 180 Hisso Standard to watch him bail out.

When the pilot had climbed the Standard to 3,500 feet he cut the gun on the Hisso and yelled at "Daredevil" who stepped out on the walk alongside of the fuselage, pulled the rip-cord ring and jumped.

The pilot 'chute on the Irving shot out into the slip-stream of the prop which carried it back and hooked it firmly around the tail skid, causing the Standard to become tail heavy and loggy. As soon as the jumper's weight hit the tail, the pilot knew what had happened so he opened the throttle on the Hisso, shoved forward on the stick and headed for a river with the frightened "Daredevil" dangling beneath the tail of the ship.

His intention was to make a crash landing in the river and try to prevent killing his three white faced passengers and the parachute jumper. He flew down low over the water and the jumper, with due credit to his presence of mind, unbuckled the leg straps on his harness, threw his arms above his head and slid through the harness into the water. The pilot, feeling the weight leave the tail, gunned his motor, rose and flew back to the field with the chute still dangling below.

"Daredevil" had hardly pulled himself from the river when cars began to arrive which caused him no small amount of embarrassment due to the fact that he was in need of a change of clothes. One of the automobiles carried him in to the hospital where he rested his shaken nerves for two days, and when he came after his chute, everyone addressed him by the title of "Tail Skid".

THE equipment that exhibition parachute jumpers now use is altogether different than what we used in the old days. Although a good many still prefer the old type 32-foot exhibition to the new type 28-foot seat or back-pack, they claim it has a slower rate of descent but the Department of Commerce has ruled that no person would be allowed to jump with a parachute unless it was manufactured under an approved type certificate, and unless they wore an auxiliary parachute strapped to them in such a manner as to operate independently of the other one.

This automatically stopped the use of all the old chutes and most of them were homemade anyway. I'm certainly not denying the fact that it gives a man a wonderful feeling of security when he steps off a wing to know that he has two good parachutes strapped to him instead of one homemade one, but the nearest that I ever came to getting killed was on account of this same emergency chute.

It happened over Richey Field, Nampa, Idaho. I was billed for a 2,500 foot free fall from 4,000 feet and was wearing a Russell training pack consisting of a 28-foot back-pack and a 24-foot chest pack. Somehow or other, I decided to open both chutes—feeding out the chest pack slowly after the big chute had broken my fall.

Rodman, the pilot, cut the gun on his whirlwind Spartan at 4,400 feet and I tumbled off of the wing. Down, down, down I went, the wind screaming past my ears and the ground rushing up to meet me at terrific speed. Then the hangar began to loom up life size, I pulled the ring on my left hip and the back-pack opened, snapping me upright with a jerk.

Slipping the ring over my wrist to prevent losing the pack cover, I grabbed for the other ring. My hand must have slipped, or something, for the next instant the chest-pack came out, part of it wrapping around my head and the rest of it shooting up and entangling itself in the other chute causing one side to pull in and partly collapse.

RIGHT there and then began the strangest descent that I have ever made in a parachute. And I was scared—and scared bad. I knew that I was dropping faster than I should, and not being able to see so that I could brace myself when I hit the ground—well, I don't want anything like it to happen again. At first I tried to tear a hole in the silk, but failing in this, I began to pull the folds of silk down on my chest with one hand while I held them with the other.

Three hundred feet above the ground I got the chute all wadded against my chest, got my head uncovered. A few moments later I hit the ground, rolled over a couple of times and sat up in a tangle of shroud lines, harness, pack covers and silk, with only my head and one foot showing. I got a wrenched leg out of it. The boys on the ground figured that I was 1,200 feet above the ground when I pulled the ring which gave me a free fall of somewhere near 3,200 feet.

ONE of the most frequent of questions asked a jumper, is whether he has any control over his body while falling through the air. At first I used to answer "no", but after I began to specialize in long free falls, I found out that a man can control himself to a certain extent.

When I first began to jump with pack chutes, I usually came out of the ship doubled up in a ball, so to speak, with the result that I kept right on turning one somersault after another until I opened the chute. One day while dropping through the air, I suddenly straightened out full length, and to my surprise, I instantly stopped turning and began to shoot straight head down. By experimenting in later jumps I found that I could use my legs as a crude rudder in the air stream to turn my body one way and then the other. Try it some time.

* * *

I guess we're about through. Somehow, the public—and the Department of Commerce—don't seem to go for it any more. With all due respect to the game I like so well, and the wonderful results it has accomplished in making parachutes better and better by thousands of tests under every kind of condition, it has no place in modern aviation today.

There was a time, a few years ago, when it served its purpose of drawing out huge crowds to the flying fields, and I have no doubt but what thousands of people became aviation enthusiasts simply because they were drawn out to the field in the hopes of seeing some fellow's 'chute fail to open.

But that was a time when a person was considered almost reckless who would ride up in one, whereas now there isn't one person in a thousand who is actually afraid to go up. The public is becoming airwise. And exhibition parachute jumping is almost a thing of the past.

END

Advertise in this Directory. Rates: $2.00 per insertion.

BUYER'S DIRECTORY

One-Inch Advertisements. No more — no less.

MODEL AIRPLANE SUPPLIES

Send your name and address for a sample of Balsa Wood and our prices on model airplane supplies.

Aero Shop, 3050 Hurlbut Ave., Detroit, Mich.

OPPORTUNITY — Make Money at Airports and Air Meets. Sell PARACHUTE TOY. Sample 15c. Two Dozen $1.50.

Box 212 Saratoga, Spa. N. Y.

BANKRUPT STOCK

Will sell all or part. Make an offer.
12 OX 5's,
11 Hisso's, 150 horsepower,
4 Hisso's, 180 horsepower,
1 Model A-1, American Eagle Biplane completely reconditioned. N. C. License.
Some motors new; all certified airworthy.

For details write K. L. BROWNE, JR.,
P. O. Box 416 Kansas City, Kansas

MODEL AIRPLANE KIT

Has all materials needed for TWO scientific models including directions, balsa spars, sheets, prop blocks, glue, wire, tissue, rubber, thrust bearings, etc. This is a real bargain. Sent for only 25c plus 5c postage. No stamps.

CAPITAL MODEL AIRCRAFT COMPANY
613 Roxboro Place, N. W. Washington, D.C.

WHOLESALE PRICES!

Balsa Wood		Grade A Polished Sheets	
36-inch lengths:		36-inch Strips:	
1/8 x 2—12 for	$0.40	1/8 x 1/8—50 for	$.20
1/4 x 2—12 for	0.45	1/4 x 1/8—50 for	0.25
1/8 x 2—12 for	0.55	Prop Blocks, Per Doz.	
1/4 x 3—6 for	0.35	5" 10c; 6" 15c; 8" 24c;	
1/8 x 3—6 for	0.45	9" 30c; 10" 35c; 12" 48c	

Orders of Less than $1.00 Not accepted. Add 10 per cent for packing. Special discount on orders of $5.00

CONSTRUCT-A-PLANE COMPANY
256 Boerum Street
Brooklyn New York

CORBEN SPORT PLANES

"CORBEN BABY ACE"
Snappy single place sport plane
"CORBEN JUNIOR ACE"
Two-place convertible sport plane
Both are now offered flyaway or in semi-built kits for the home builder.
Send dime for illustrated folder

CORBEN SPORT PLANE CO.
2002 E. Johnson Madison, Wis.

U.S. NAVY "CORSAIR"

Complete 9x12 20 page illustrated book containing full-sized detailed drawing of "How to Build the U. S. Navy Corsair," also pictures and autobiography of Chance Vought.

Special Price 25c Postpaid

CRITERION PRINTING CO.
21 East Fourth St. New York

FOR SALE

1—Curtiss Wright Junior
1—2 Place, dual control, metal structured Glider.
1—Single place primary Glider.

ALL NEW

C. ELLIOTT ◆ SHELBY, MICHIGAN

License Examinations Made E-Z

Booklet of 300 typical exam questions with correct answers, includes 1932 changes in Air Traffic Rules and Regulations, Airplane Rigging, Engines, Ignition, Navigation and Meteorology. Covers all grade Pilot and Mechanic written exams. Send one dollar today.

Booklet of Safety Flying Rules. 115 Don'ts with reasons on twenty flight maneuvers. Price 50c.

E-Z Aviation System, Box 6 P, Rosedale, N. Y.

UNPATENTED IDEAS CAN BE SOLD

I tell you how and help you make the sale. Free particulars. (Copyrighted)

Write W. T. Greene
927 Barrister Bldg. Washington, D. C.

Aeronautical Research & Consulting Engineers

Factory Planning Airport Development
Aircraft Designs — Models — Drafting — Etc.
Technical Advisors to Picture Studios, Radio Stations, Newspapers, etc.
Reasonable fees—Time payments for Amateurs
Inquiries Promptly Answered

Wm. B. HARTY & CO., Box 22,
Findlen, Mass., U. S. A.

PROPELLERS

Order from this ad, increase your ships performance.
4-ft. diameter for motorcycle motors..... $ 4.50
4-ft. 6-in. for Heath-Henderson metal tipped.... $ 8.98
5-ft. 6-in. for Ford T and Chevrolet metal tips.... $10.98
6-ft. for Ford A, Lawrence & Anzani metal tips... $12.95
8-ft. for the 0 x 8, laminated Oak, copper tips.... $19.95
Photo, Specifications. Bristol Cherub Type Motor selling at $150.00 and other bargains including leather bound flying Manual 25c stamps.

HIBBS, Ft. Worth, Texas.

READY TO FLY

All Balsa Model Airplane
R. O. G.—19 inch Wing Span
Completely finished
GUARANTEED to fly
$1.00 Post Paid

JUNIOR AIRCRAFT CO.,
4327 No. 40th Street, Omaha, Neb.
AVERAGE FLIGHTS OVER 1000 FEET

FREE — Celluloid Cowling — Free!
With every order of $1.00 or more we will give absolutely FREE one celluloid cowling. This offer expires July 31st, 1932. Add 10c packing and postage.

Rubber 1/8 flat, 3 ft.	.01	1/8 x 1/8 x 24" Balsa 3 for	.01
Wire .020, .028, 4 ft.	.01	1/8 x 1/8 x 24" Balsa 3 for	.01
Celluloid wheels, 1 7/8 diameter, per pair.	.11	1/8 x 1/8 x 24" Balsa 5 for	.02
Jap Tissue 20 1/2 x 24 1/2	.02	1/8 x 1/4 x 24" Balsa 4 for	.02
Colorless cement, 2 oz.	.14	1/8 x 1/4 x 24" Balsa 4 for	.02

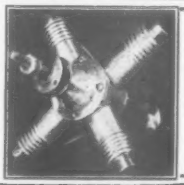
Send for price list.

MAJESTIC MODEL AIRCRAFT COMPANY
100 Fifth Avenue, New York, N. Y.

WARTIME PLANES

For sale: Hundreds of sharp, clear, actual photographs of pioneer, wartime, and modern airplanes. All 7 1/2 x 9 1/2 inches in size. Send for free list and please mention Popular Aviation.

R. R. MARTIN
1615 N. Western Ave. Hollywood, Calif.



MODEL MOTORS

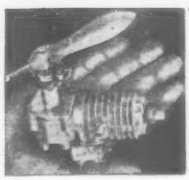
New 4 cylinder compressed air motor develops 1/10 H.P. at 1500 R.P.M., drives 14 in. to 18 in. props. $6.50 ready to run. Finest scale models and new supplies. Blueprints for 6 ft. Biplane, gas and steam motors. 1932 catalogue 10c.

Miniature Aircraft Corp.,
83 Low Terrace,
New Brighton, N. Y.

Build Real Models of **FAMOUS PLANES!**

Over Plans—300—Kits to choose from

New 1932 Catalogue, highly illustrated, CASH 10c. This same Catalogue with "red-line" inserts 15c.
MODEL (PA-1) AIRCRAFT, Whitewater, Wis.



MODEL MOTOR

1/2 H.P. Gas Motor, complete with gas tank, propeller, battery coil, ignition ready to run $35.00. Catalogue 10c.

MINIATURE AIRCRAFT CORP.
83 Low Terrace
New Brighton, N. Y.

AMAZING VALUE!

60c for $2.00 Worth of BALSA (sent p.p)

At least $2.00 worth of clean, straight-grained, sheet, strip, and block balsa wood—odd sizes but guaranteed usable—enough to build at least 25 models—limited number—Rush Orders. 5 bundles for $2.50 postpaid.

Send 2c for our New Low Price List.

MODEL AIRPLANE SUPPLY, Dept. A
1140—53 rd St. Brooklyn, N. Y.

FINISHED SCALE MODELS

Pine Wood Construction; Glossy Finish; 4 3/4 in. to 6 in. wingspan. Gee Bee, Hawk P6-E, Boeing, Texaco 13, Hell Diver, Howard Racer and all other popular Planes except Wartime Models. Price is $1.00 Postpaid. No C. O. D. Orders. 35c Canadian and Foreign Charge.

MUELLER BROS.
28 Peach St. Buffalo, N. Y.

IMPORTED FROM FRANCE

Genuine World War Souvenirs. Newport 28 pursuit plane ailerons covered with insignias, excellent wall decorations $2.00. German propellers $5.00. Lightweight Gnome cylinders for ash trays polished 50c, 3 for $1.00. Gnome 165 piston rings make perfect paper weights, postage paid, 5c each.

Send postage for lists

MARVIN A. NORTHROP AEROPLANE CO.
730 Washington Ave. N. Minneapolis, Minn.

PLANE BUILDERS NOTICE

Dope nitrate pigmented $1.00 gallon. Sportplane wheels $1.50 Jenny with motor $75.00 delivered. Damaged Travel Air $95.00. Curtiss Robin fuselage $40.00. American Eagle $150.00. Altimeters $3.00. Star compass $10.00. Pioneer bank and turn, new, $50.00. Plywood 20c foot hub. Ford engine $1.00.

Send postage for list

MARVIN A. NORTHROP AEROPLANE CO.
730 Washington Ave. N. Minneapolis, Minn.

PROPELLERS

4-ft. diameter, for engines up to 7 HP..... $ 8.75
4 ft. 6 in. for Henderson, Ace 4, etc..... $12.50
5 ft. for Harleys, Twin Indians, etc..... $13.25
6 ft. for Ford "A," "T," Chev., Star 4, etc... $16.50
7/32x7/32, 1/4x1/4, 1/4x1/2 spruce, 500 ft..... $ 5.00
Dope $1.50 gal. Thinner $1.50 gal. Pinked tape 3c yd. Grade "A" fabric, 50c yd.

OSTERGAARD AIRCRAFT
4305 N. Narragansett Chicago

LIMITED OFFER

I have on hand one hundred copies of the regular $1.50 book, "A-B-C of Flying and Gliding," and one hundred sterling silver wing pins worth $1.00 each.

Special Price
BOTH *For* $1.00 *Postpaid*

THOMAS REDDING
3179—35 St. Astoria, N. Y.

Roosevelt Aviation School, Inc.

Government Approved for
Private, L. C. and Transport,
Ground and Flying Courses.

119 West 57th St., New York City — **Roosevelt Field Mineola, N. Y.**

Fine 20-inch scale models of the Curtiss Hawk P6E, and the Curtiss Falcon AC3. Beautiful ornaments for the radio or mantel. These models have a fine detailed finish and most realistic appearance. Reasonable prices. Photographs 10c each.

VICTOR STANZEL
Schulenburg Texas

Lowest prices on small engines, propellers and hubs for light planes, windwagons, boats and scooters. Indian twins with props, $35 to $50. Ford "T" and Ford "A" motors, ready to fly, $50 to $95. Efficient propellers, $4.75 to $12. Monocycles, $20. Flying Flivver blueprints, $5. Prints on "How to make the Ford Motor Fly," $3 set. Circulars, 10c.

STORMS AVIATION CO.
Spartanburg, S. C.

DIRECTORY
(*Continued*)

BOYS! FREE PLAN

With every order of $1.00 or more perfect-cut-smooth-balsa 36 inches long, ¼ inch square, 7 for 5c; ¼ inch square, 5 for 5c; ¼ in. x 2 in. x 36 in. each 5c; ¼ in. x 2 in. x 36 in., only 6c. Jap. tissue (any color), 4c per sheet. Send stamp for price list and samples.

SWALLOW-MODEL-AIRCRAFT
3840 N. NEWLAND AVE., CHICAGO, ILL.

Guaranteed "Pocket Radio"
Only $2.00 Postpaid. 300-1000 mile range. No Batteries or Tubes needed. Testimonials galore. Get yours NOW Cash or C. O. D. orders accepted. Do not wait. Catalogue. 10c postpaid.
NEIL C. TASKER, Shamokin, Penna.

Boys! Young Men! Learn to Fly!
Guaranteed Home-Study Course in Aviation. Only $1.00 postpaid. Complete, Accurate, Reliable. Special Offer. Rush $1.00 NOW! Your money back if you want it.
NEIL C. TASKER, Shamokin, Penn.

CLEAR NITRATE DOPE
$1.20 per gal. in 5 gal. cans
1.40 per gal. in 1 gal. cans
Clear Aircraft Patching Cement
$2.25 per gal. in 5 gal. cans
2.50 per gal. in 1 gal. cans
Special cements and dopes made to order. Write us your requirements, very reasonable prices.
UNITED AIRPLANE SUPPLY CO.
1291 Clinton Avenue Irvington, New Jersey

Classified Advertisements

LATHES—used and reclaimed South Bend Lathes. One 9-inch $127; 13-inch $276; 16-inch $388; just a few left. Guaranteed good as new. Terms, or discount for cash. South Bend Lathe Works, 320 E. Madison, South Bend, Indiana.

What to Invent—Names of manufacturers and wanted inventions sent free on request. Use our legal form for recording proof of invention. Write W. T. Greene, 955 Barrister Building, Washington, D. C.

MAKE SIMPLE CRYSTAL RADIO. "MELOMITE CRYSTAL" With Instructions, 25c. New "MELODY KING" CRYSTAL RADIO $1.00. Complete with Phone, Aerial, $2.75. MELOMITE COMPANY, 7786 FAIRMOUNT STATION, KANSAS CITY, MO.

OUR readers have definitely formed the habit of consulting the Buyer's Directory when in need of airplane supplies and other merchandise.

Month by month it is becoming a more effective advertising medium and it continues to expand on a merit basis alone.

Ancient Ship
(*Continued from page* 22)

ical flight and all bedecked in whipcord and leather coat.

He had dropped around with the suggestion that we run out to the airport in his car and take a flight over the city. Just then the daily mail plane roared casually overhead not five hundred feet up, screaming its way into Swan Island Airport.

Agreeing to my friend's proposal, we went out to the field and were soon upstairs in the blue and the fleecy white. As I looked down on the mottled landscape and the gleaming Columbia River slowly sliding past fifteen hundred feet beneath us, I could not help wondering what the thoughts and reactions would have been of any aerialists dauntless enough to ascend fifteen hundred feet and attempt to navigate—or avigate—in such a contraption as is shown herewith.

Possibly their greatest concern would have been the gas-tightness of the silky spheres weaving slowly back and forth overhead in an 1852 spring breeze—all laws of Newton to the contrary.

Can we not assume that the mighty 6,500,000 cubic-foot Akron, monument to present-day engineering skill, courage and exactness is, after all, a remote descendant of this Fantasy of the Fifties, enormous but clumsy conception born of Man's desire to equal and excel the birds in their freedom and grace?

Perhaps, too, the colossal Dornier Do-X, liner of the air, can trace its lineage to such as this crude air-machine of pre civil-war days.

And will inter-planet explorations be the vogue another eighty years from now? Perhaps to discover new minerals and metals unknown to the earth's crust? And even permanent mammoth floating air-stations, anchored over mid-Atlantic, with ship-servicing accommodations, and quick-lunch grills may materialize.

Who, looking back eight decades, can prophesy eighty years ahead?

Pegasus, the winged horse of abundant power and endurance, has proved to be more than a Myth today. Tomorrow—what?

END

Cirrus Engine
(*Continued from page* 29)

with branches to each inlet valve port. A hot spot is provided in the central section, a pipe being taken from the exhaust manifold so that the exhaust gases can circulate.

Lubrication of the upright Cirrus is combination force feed and splash. The oil pump is situated at the lowest part of the base so that it is always flooded or self-primed with oil. Oil from this reservoir is forced, by a gear type pump, through a gauze filter which is placed horizontally above the pump, thence through the main delivery pipe to the oil manifold on the left side of the engine. The latter is connected to passages drilled in the top half of the crankcase and running to the bearings. Oil is thus forced under direct pressure to all bearings.

The hollow crankshaft is also force fed. Excess oil escaping from the ends of this shaft and the connecting rod bearings is converted into a fine mist by the rapidly revolving parts. This mist permeates the entire interior of the crankcase chamber, thoroughly lubricating the cylinder and all friction surfaces not fed by oil under pressure. The surplus oil returns to the reservoir where it is doubly screened and recirculated.

An adjustable, spring controlled oil pressure regulator is incorporated in the oil line. Its principal function is to control the oil pressure, regulating it to twenty-five pounds at cruising speed. The discharge of the pump is greater than that required to lubricate the bearings and cylinder walls and the excess pressure automatically raises the valve against the adjusted resistance of the spring, discharging the surplus oil back to the reservoir.

Pipes are also connected to the ends of the oil manifold, the forward pipe carrying oil to the propeller shaft radial thrust race, and the rear pipe to the timing gears so that the oil from it lubricates the teeth of the gears.

The weight of the Cirrus is given at 275 pounds, dry. Bore is 4.330, and stroke 5⅛ in. At 2,100 revolutions per minute, the maximum horsepower (95) is developed.

END

Open Letter
(*Continued from page* 26)

When better airplanes and better engines are built, the Government will buy and use them in its air forces.

Informed men know that American planes and American engines are as well developed in point of efficiency and dependability as those of any country in the world. They know that American exports of aeronautical products last year far exceeded that of any other country. That the Pratt and Whitney engine is in demand in other lands for use in their fighting, as well as other types of planes.

They know that our Army and Navy fighting squadrons, flying Boeing fighting planes, are the finest trained and most effective aerial fighting units in the world. That our U. S. Marine Corps aircraft squadrons, operating in Nicaragua, are setting up a record of military flying performance for all nations to shoot at. The American Eagle's wings are strong and swift. We need have no fear for him, in the air or on land or sea.

It required no investigation to discover that the Government is granting airmail contracts to those operators who have pioneered and developed

(*Concluded on next page*)

America's airmail system. Operators who have stood the burden of costly experimentation and expensive construction in blazing out the trails of America's Airways.

Operators whose pilots have given many lives and thousands of hours of dangerous strenuous flying in airplanes, still in an experimental stage of development, in order that the airplane may attain its present creditable position in our modern systems of transportation. Operators who have given our United States the most complete, efficient, safe and dependable network of commercial Airways of any nation anywhere.

It is surprising to no one except Mr. Liggett that our Government is trusting its mail to those long established dependable proven airlines. It is difficult to imagine an intelligent Government doing otherwise.

THE second misleading article is by Mr. L. T. Beard. Mr. Beard's letter is dangerous, not because of any bearing it has upon the unfortunate messy E. L. Cord affair, but because of the impression it will create in the minds of young pilots. Mr. Beard would have the young student pilot believe that when he has received his transport pilot's license he has attained the ultimate in flying perfection. He is a trained experienced pilot.

This is a dangerous impression to create in the mind of a young pilot who has just received his transport license. I have attended the funerals of many fine young pilots, close and intimate friends of mine, whose mental picture of themselves as a pilot far exceeded their real abilities. Most of them were more skillful pilots than I will ever be, but they had not learned at two hundred hours of solo time that they were only starting, only beginning to learn the profession of flying.

There is as wide a gap in years of study and experience between the newly rated transport pilot and the professional airline pilot as there is between a student in a medical school and a physician with an established reputation.

I have flown airplanes for several years. Flown all types under many and varied conditions in military service and in civilian life. Long ago, I learned a lesson and every day I fly this lesson is repeated. I know it well by now and it is simply this: that the next flight I make will teach something about this flying game that I never knew before.

The young pilot who intends to make piloting his profession should try to realize the bigness, the scope and breadth of the field he is about to enter. He should be prepared to spend the years in work and study that are required to make him a skilled and thoroughly competent pilot, a master in his chosen work.

Yours for American Aviation,
W. G. Golien,
Airmail Pilot.

Berlin to London

(*Continued from page* 28)

"We are at Hannover, we're going to land," she shouted.

"Hurrah! I always wanted to see Hannover," I yelled back.

I let everyone get out of the plane and then staggered out into the beautiful sunshine.

"It was wonderful," cried Mildred.

"But, Milly, it was a trifle rough, wasn't it?"

"The man behind me said it was as rough a trip as he has ever experienced."

"I told you the wind was blowing," I said, feeling a little better about everything.

The air did wonders for me. When we got into the plane again I had no fear of the rest of the trip. It was a little rough from Hannover to Amsterdam, but I had revived enough to take an interest in the landscape below.

Staunch rows of forests swept past, toy people moved on the roads that bisected the fields and the forests. Towns were all around us, their church spires gleaming in the sun.

To the right appeared a big body of blue water and the ground underneath the plane changed its contours. There were no forests now and the land was plotted out into rectangles. One rectangle seemed covered with water, the other green with vegetation.

The man behind me nudged my shoulder. He pointed to the big body of water. "That is the Suider See," he shouted.

"Then we are in Holland?"

"Yes, can't you see the dikes and windmills?"

The plane gave a sudden lurch and I could see the big rubber wheel outside my window. I disgraced myself for the last time. Again I felt the plane circling down, with motors half cut off. We landed easily on the Amsterdam airport. I stumbled out of the plane.

THERE was not much of Amsterdam we could see from the airport. The breeze was warm, wet and sticky. I saw them transferring our bags to another plane.

"If I was as sick as you were, chappie," said our English friend, "I'd have called an ambulance at Hannover."

"I love the air," I muttered. "You couldn't keep me out of it."

I knew that I was going to enjoy my air ride from Amsterdam to London the moment I sank into the luxurious cushions of our new plane. There was absolutely no motion to the air lanes now and we floated along as though suspended in mid-air, while the landscape rushed by beneath us. We had no idea that so much of Holland was under water until we saw it from the air. The dikes, the windmills, stood out in bold relief, while to our right sparkled the waters of the North Sea. We hopped over a bit of water and my English friend told us to look down on the level coast line of Belgium.

They were bathing in the sea down there. We could see the tiny bathhouses, umbrellas and specks of people in the ocean and on the beach. The towns seemed to be built on the ocean side, with streets that ran along the beach. As we neared one of these towns Mildred leaned over and yelled in my ear:

"They say that is where the Germans kept their submarines during the war. Near Ostende." I nodded gravely. We were following one of the Zeppelin routes to London.

From Ostende our plane continued to follow the Belgium coast and soon we were over France. Dunkirchen passed below. Suddenly we seemed to turn a corner and ahead was a broad sheet of water. On the other side of this water cliffs arose, white in the setting sun. It seemed to be a big island over there.

"Look . . . look," Mildred cried. "Down there is Calais and over there is England. See the chalk cliffs."

Our plane headed out over the channel and presently the soil of England was under us. That part of England was rolling and hilly. The verdure seemed to cling so closely to the ground one had the impression that the farmers came out each morning and clipped it short. Towns appeared. Then dead ahead a vast smoke pall spread out against the sky. To our right and below a long serpentine ribbon of blue showed. Mildred grabbed my arm and pointed to it.

"The Thames," she shouted. "And that is London."

Our plane roared on heedless of our racing pulses. We had conquered the air together. No Lindberghs could feel the thrill that we felt. In our first airplane ride we had flown 575 miles. Our flying time was five hours. Down through the rays of the setting sun we circled over Croydon airport.

I put my two No. 13s on the soil of England and grinned at Mildred.

"I'm certainly glad I didn't let you come by train like you wanted to. I wouldn't have missed that experience for anything," I said.

Mildred, my wife, linked her arm in mine and we set off rather unsteadily to the customs, happy as two children who have just had a ride on a roller coaster.

END

PHOTOS OF AIRPLANES

MANY of the photographs that have been published in this and previous issues of P. A. are for sale. The price is $1.00 each.

Give us the month of the issue, page and name of the photo requested.

Photo Department

POPULAR AVIATION
608 S. Dearborn St., Chicago, Ill.

Airy Chat

(*Continued from page 6*)

believe in a certain amount of control over flying, but not the bureaucratic brainstorms and repressive legislation that constitutes the new laws. When we get this civilian training thing entirely off our hands, we will give our full attention to the license laws, the reason for them and the reason why they should be modified.

And so, fellows, just write in your letters, articles or what have you, and we will start the big parade at once. The sooner we start—the sooner we'll finish, and that will be none too soon.

* * *

YOU fellows who are interested in statistics might take note of the fact that the average passenger, John Smith, could travel around the earth 1,000 times before he would run a chance of becoming involved in a fatal accident. Or, again, he could travel on an airline for 481 years before Old Lady Luck would go back on him. The chances of being killed in an airline accident are very remote.

* * *

AND here is where we wish to make a plea. When you wish to receive an answer to a letter addressed to this office, please attach your name and address—it will help much toward an early reply. And again, please print your name and address. Some of the signatures are so nearly undecipherable that they are hardly better than no signatures at all.

* * *

A LOT of fellows wonder why airplane flying lessons cost so much, and are rather inclined to believe that the schools are rubbing it in. Not at all, for the writer has had several years experience along this line and knows what it costs.

If the schools could get gas for nothing, their ships for nothing, the field rental for nothing, hangar space for nothing, and the instructors were willing to work for nothing, then the school would still be spending good money. There would still be the nice big bill for repairing the crack-ups and that's something—take it from me.

* * *

IF I could rent a ship for dual instruction at ten dollars per hour, I'd be mighty certain that the school would not get up into the million dollar class in a hurry—nosiree!

* * *

WE HOPE that you like our enlarged model department. We've tried to cover the ground as completely as possible, and it is our opinion that we have accomplished this thing.

* * *

I WONDER how soon it will be before we start sailing through the stratosphere? There are about a dozen experimenters sawing away on boards and other things in the hope that they will reach that region of the black skies and the sub-zero temperatures.

IN NEXT month's issue we are going to run the official questions and answers for the transport pilot's license in just about the same way that we ran the mechanic's exams. The pilot's exams should be even more interesting, and you will probably be surprised to discover what sort of questions they are.

I'll bet that there is not one out of ten of our readers who knows the class of subjects taken up in these exams—let alone being able to answer them.

* * *

WE'VE kinda cut down on the length of the old "Q. & A." to avoid too much of this question and answer stuff in one issue. When we run out of the official dope on the different license examinations, then we will again expand the old Question and Answer Department. This is in reply to a number of our correspondents who have asked the reason for the cut down on the Q. & A. department.

* * *

NOW, we're always looking out for the desires of our readers—what they like and what will prove the most interesting for the majority. We can't satisfy everybody—an impossibility—but we do aim to strike a happy medium or compromise. And the only way that we have of telling what pleases you is from your letters of comment mailed to our editorial department.

The question now before the board relates to mechanical subjects. Do you prefer descriptions of plane, engines and various things relating to the principles of flight or aeronautic science than simple stories and general remarks? Please write in and tell us how you stand on the subject of mechanical features. We'll accept your vote.

* * *

IVRON ERWIN, Galliopolis, O., writes that he has completed a Heath Model V Parasol, but that the state laws of Ohio will not permit him to fly this ship within the state boundaries. (Ain't this something?) On the contrary, the Federal government will allow him to fly it under his identification number.

As a result, he is considering putting pontoons on the ship and flying it over the Ohio River, which he believes is out of the jurisdiction of both the state of Ohio and the state of West Virginia. In his opinion the government owns the river, and this gives him the right to fly over water with his identification number. He solicits communication from our readers regarding the installation of pontoons on his Heath, and he will also be in the market for a set of pontoons. Address, Mr. Ivron Erwin, 919 4th St., Galliopolis, Ohio.

* * *

WHILE we are on this subject, let's read a letter from Irvin R. Barclay, R. R. 5, Bloomington, Ill. Mr. Barclay writes with so much pep and vigor, that he must have smacked up against a state inspector recently—or something. It is a goat-getter, there's no doubt about that. And friend Barclay writes as follows:

I was reading this afternoon, on that page in POPULAR AVIATION *where it said that we readers should send in our complaint. Now it didn't say just what complaint to send in, but I have a pretty good idea. My guess is that it refers to these unreasonable state air laws.*

Like a lot of other fellows, I am one who prefers to build my own. I began construction on my ship two years ago last August. A friend of mine, who is a mechanic and who learned to fly about twelve years ago, has helped me quite a bit. We worked in spare time which has been rather spare.

My ship is a tandem two-place high wing monoplane. It is a cabin job with windows of pyralin entirely around the cabin and a window in top. It is also a folding wing job. There are two gas tanks of about twelve gallons each, and a three gallon oil tank.

It has a twenty-nine foot span, 5-ft. cord, and is about 18½ feet long. It

PATENT YOUR IDEAS REGISTER YOUR TRADE-MARK
Z. H. POLACHEK
1234 BROADWAY
31st NEW YORK
REG. PATENT ATTORNEY PROF ENGINEER
WHAT IS YOUR INVENTION?
Send me a simple sketch or model for
CONFIDENTIAL ADVICE
DO IT NOW

AERONAUTICAL ENGINEERING
B.S. Degree in 2 years
School of Engineering
49th Year
Properly trained engineers in design, research, manufacture and sales work are in demand.
For ambitious earnest students—the Tri-State College course in Aeronautical Engineering, 108 weeks. Bachelor of Science degree. Graduates in Mechanical Engineering can complete aeronautical course in 2 terms (24 weeks). Thorough training in all fundamental engineering subjects. Non-essentials eliminated. Courses designed to save student time and money. Flying school facilities available at nearby airports. Enter September, January March, June. Courses are offered also in Civil, Electrical, Mechanical, Chemical Engineering, Business Administration and Accounting. Living costs and tuition low. Those who lack high school may make up work. Students from 48 states of the Union and 45 foreign countries. Graduates successful.
772 College Ave. Angola, Ind.
TRI-STATE COLLEGE

mounts a Le Blond 60 motor. The ship will weigh about 750 pounds empty. It is completed excepting gas and oil line connections, upholstering, putting in pyralin, and covering. I have pyralin, covering and dope in my shop ready to be added. But I am just stalling now until I find out what is what.

You will note that my ship is in the same class as the Monocoupe. I formerly built wings for the National Airway System, builders of the "Air King". We have proceeded very carefully in our design and construction. Our fuselage is of welded steel tubing and has a split type landing gear of about 7 ft. spread. I talked to an inspector, Mr. Reed, and showed him snap-shots of this ship. He was favorably impressed. Like others, we have no stress analysis, but have used that careful judgment used so successfully by so many amateur builders. We used considerable brazing which was one objection of the inspector.

I understand, the way the law stands, that if I should finish this ship and fly it, I would be subject to arrest, even though I spent hundreds of dollars (almost all I have) and hundreds of hours in its construction. Am I correct? The ship was built as an experimental folding wing job, with production in mind. We have given up the idea of production on account of the mountain of difficulties presented by the Department of Commerce. But I would like to finish the ship and fly it.

Now I register my complaint, and a very emphatic complaint it is. I am willing that all ships carrying pay passengers should be licensed by the Federal government. But when they say that a fellow cannot build his own ship and fly it, that is too much. I see no more reason for licensing a private ship which does not carry pay passengers than I do for a private automobile or motor boat. Flying, I feel, is the safer of the three.

Some of these days we will have to have a license to jump off a soap box or fly a box kite. They are in effect paralyzing private flying. There is only one virtue in that; it will help the transport companies by forcing the rest of us to ride with them. But that virtue is questionable because the rest of us want to fly our own ships. Who wants to pay a fancy price for a new or even used ship and have an inspector come around in two or three years and cry: "Obsolete! obsolete"!

Who made these laws—I didn't! They must have been made by a bunch of saps who don't know what ailerons are for. Isn't there room enough in God's great heavens for us "little" fellows to do a bit of wholesome experimenting on our own? I say, let the government put whatever standards it cares to on ships used for pay passengers, but beyond that pray give us a little line to play.

I admit I have been tending too much to business. I'm not up on just what you are doing or how you intend to present these complaints. I get most of your issues and like them fine. Couldn't we fans all get together and fan till we are listened to? I would be glad to get a letter from you stating what you might have to say.

Here is an idea I have harbored. My ship's wings fold. I can set the tail in the back of my little truck and go down the road thirty-five miles an hour. Might I not make a covering for this ship and go from town to town? Have big words on the sides. As soon as a crowd gathers, take up a collection. Then remove cover and make a speech on skeleton construction and exhort the citizens to come to our support. Do you believe I could get enough nickels and dimes to pay for my gas, etc.?

Please be sure to count my complaint, and I wish success for this movement.

this ship and go from town to town?

That's a novel idea of arousing interest among the citizens, Irvin. Maybe it will work and maybe not. You know that there are still a lot of old fossils who still believe that an airplane is only for army use. You'd be surprised at the fool questions that come in to this office from the "man-in-the-street". We're gathering force on this license business, and anything that you can do along this line to help us will be appreciated. I am of the opinion that these laws were ready made by certain corporations, and then put over on the poor legislators who don't know the difference between a take-off and a ham sandwich. Most of these politicians think that an airplane is for the purpose of making air.

* * *

WE HAVE just received a sample copy of a new elementary book on the art of flying, and it is one of the best made up jobs for the beginner that we have seen. Nothing theoretical about it—just how to pull the stick and rudder bar. It is written by Assen Jordanoff, a Bulgarian aviator, and is published by Grosset and Dunlap, New York. This book of 113 pages bears the title, *"Flying and How to Do It"*. It is very cleverly illustrated. Sorry, but they forgot to mark the price on it.

* * *

WE NOW have another claimant for honors in photo collecting. This is A. A. Askew, Jr., Barrytown, N. Y., who has a collection totalling 1,335 pictures and 264 drawings. This is a collection—you said it.

* * *

NEXT, we have a fine letter from that veteran in the lightplane field—B. H. Pietenpol, Spring Valley, Minn. Everybody knows "B. H." and

2500 Rooms $3.00 UP

CHICAGO'S
MORRISON HOTEL
CLARK AND MADISON STREETS

HERE amid an atmosphere of refinement the slightest needs of guests are anticipated. Reasonable rates prevail always.

The central location of this hotel makes it the nearest to stores, offices, theatres and all railroad stations.

Special floor reserved for ladies.

Each guest room is outside with bath, circulating ice water, bed-head reading lamp and Servidor. Automatic garage facilities.

Write or wire for reservation.

LEONARD HICKS
Managing Director

World's Tallest Hotel—46 Stories High

Mill Importers of
Model Airplane Japanese Tissue Paper
WOOD VENEER
made in 32 colors
WHITFIELD PAPER WORKS, INC.
16 Vestry St., New York City
Est. 1869

his letter is full of meat. He writes thus:

I have been a reader of your magazine since the first one, and believe you are for the home-builder and amateur flying.

I believe I have received a hundred letters stating (from home-builders of aircraft) saying that their state has passed a law, making it unlawful for anything but licensed ships and pilots to fly, and asking what they must do.

While I do not believe such a law can be enforced, I think there should be some regulations.

Could you not draft up a set of rules and regulations for a Special Non-Commercial Private license, on planes (and pilots if necessary), and print it in POPULAR AVIATION *so that it could be signed by your readers and sent to the head of their state or direct to Washington to get such a special license law through?*

Inclosed are my suggested ideas on the matter.

I would like to see, and will work to get, a special non-commercial license for all home-built ships and all other ships used privately.

I would like to see these ships inspected by government inspectors any time they thought necessary. Their findings would then be put on a card on the ship where it could be easily seen, stating condition of ship when last inspected.

And all ships not passing fair or above 75 per cent must be fixed up, before they could be flown or sold except for junk.

Also making a stress analysis unnessary, rather depending on good judgment and common sense for good design.

I have found a stress analysis very unreliable from my experience.

We have thousands of private pilots. Why should they be forced to keep a commercial license on their ships or kept from licensing their private ships and having them inspected?

I am in favor of having the inspector come to the ship, not fly the ship to him, hundreds of miles, and wait for days to have it inspected. And let the inspector be an advisor and helper of the private flyer.

If you and the other lightplanists will write in suggestions for a revised inspection and pilot law, we would certainly be glad to draw it up in regular form. After this was done, the form could be signed by our readers, as you suggest, and then mailed to the proper authorities.

After we get things started and agreed upon, then we can work up a proposed amendment.

END

$1 FREE Wing Emblem With Our $2.00 Grade **Aviators' Helmet**

Made of white gabardine, custom tailored, low neck, chin buckle, goggle-straps, ear puff pockets, non-rip seams. Sent prepaid for $1 or C. O. D. plus postage.

No. C. O. D. to foreign countries

SMOOKLER—Dept. 20, 489 8th Ave. N. Y. C.

Injection System

(*Continued from page* 30)

erating cam. This whole assembly is carried on an extension of the crankshaft thrust bearing retainer.

The fuel injection hammers are carried in special guides in the crankcase front section. They are provided with springs which seat against the cam bearing support. A special stop cam having nine lobes, one for each hammer, is arranged concentrically around the hammers and restrains their movement for the purpose of controlling the length of stroke of the injection pumps. This control cam is moved rotatively by a rack and pinion connected to linkage on the outside of the crankcase, which in turn is connected to the air valve on the rear section.

The injection pumps are mounted directly in line with the injection hammers and approximately on the centerline of each cylinder. They are made up of duralumin forgings which form the body and a pump plunger with suitable packings which provide a tight seal and freedom from scoring when using gasoline as a fuel. The pump plungers have on their innermost ends, flanges which engage in slots in the injection hammers.

The pump cylinders are provided with inlet and outlet valves arranged so there is no serious trapping of air in the cylinders ahead of the pump plungers.

The fuel injection nozzles are simple in form, designed to require a minimum of attention, and are located in the front of the cylinder heads immediately above the spark plugs. They are connected to the pumps by means of steel pipes of uniform length for each cylinder.

The fuel supply system consists of a standard fuel pump. This pump delivers fuel to the under side of a circular manifold. Suitable screens are provided in this manifold, arranged concentrically around the inlet port to each injection cylinder. This manifold is especially designed to carry off any entrapped air which may find its way in with the fuel. Excess fuel and entrapped air is carried off through a fuel pressure relief valve and is returned directly to the main fuel supply tank in the airplane.

The general method of operation of the injection pumps is as follows: The fuel pump hammers are provided with shoes which engage four lobes of the pump operating cam. These cams draw the hammers inward toward the axis of the crankshaft. The cams are so arranged that the hammers are drawn back slowly in order to permit the flow of fuel into the pump cylinders at a normal slow rate. Their contour is such that they overrun a sharp edge on the shoe, permitting the springs which have been compressed by the inward movement of the hammers to return the hammers with a rapid movement. Clearance is provided between the heads of the hammers and the heads of the injection pistons and arranged in such a manner that a sharp hammer blow is imparted to the piston, assisting in the fine atomization of the fuel. The pressure of fuel discharge can be regulated by the adjustment of the springs which control the hammers and injection valves.

The hammers are restrained from their outward movement by the nine-lobe cam previously referred to, which

SUBSCRIBE TO "P. A."

NOW, the best and surest way to get POPULAR AVIATION is to subscribe for it. You get it about a week earlier in the month—and you are certain to get every copy. You don't need to pay now. Fill out the coupon and we will send the bill ($2.50) later.

SIGN THIS COUPON NOW!

POPULAR AVIATION
608 S. Dearborn St.
Chicago, Ill.

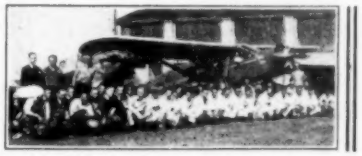
Please enter my subscription to POPULAR AVIATION for one year. I want to be sure to get each copy as soon as it is off the press, before it can be purchased at the news stand. Send me a bill later for $2.50.

Name.....

Address.....

City.....State.....

A Million Dollars Couldn't Buy BETTER Training!



THE BEST Aviation training that money can buy. That's what you get at the Lincoln School! You can pay less, and get cheaper training. You can pay more, *but you cannot get better training!*

ATTRACTIVE OPPORTUNITIES are in store for men who prepare themselves now for a career in Aviation. Air transportation has substantially increased during the past year, while other lines of business have been standing still. Let us train you at this Lincoln School for one of the best positions as pilot or mechanic. Highest type equipment and instructors. Aircraft factory in connection. Our graduates are holding many of the higher positions of responsibility in Aviation.

LINCOLN AIRPLANE & FLYING SCHOOL

233B Aircraft Bldg., Lincoln, Nebr.

Approved by U. S. Dept. of Commerce as Private, Limited Commercial and Transport; Both Flying and Ground School.

If interested, write today for Catalog, stating your age!

is operated by the rack and pinion, which in turn is interlinked with the throttle valve. The adjustment on this control cam is sufficient to completely cut off the pump stroke if desired and on the opposite end of the travel provides sufficient stroke for full throttle operation. Because of this particular design, there can be no overtravel of the pump plungers, which, together with the sharp cut-off, prevents after-dribbling of the injection nozzles. This special feature has been made the subject of patents granted to Stephen A. Hasbrouck, one of the company engineers.

The linkage between the injection pumps and the air valve is such that proper proportioning of air and fuel may be had at all speeds from idle to full throttle at sea level or at any altitude between sea level and the maximum altitude to which an airplane can fly. This linkage is so designed that full opening of the air valve may be had at any given altitude.

The pilot's controls are similar to the standard controls and designed to mount interchangeably in place of the standard control quadrant. They consist of a lever which is connected to the linkage on the air valve controlling the injection pump stroke and metering of air with the one lever. The usual mixture control lever is replaced with a similar one which varies the setting of the pump stroke with respect to the air valve and does not interfere with the free movement of the main control lever. A third lever is connected in the usual manner to the magneto advance and retard mechanism, inasmuch as with this system magnetos and spark plugs are employed as in the conventional engine with carburetor. The controls, therefore, being arranged and operated in a standard manner, do not tend to confuse the pilot who is used to flying a standard engine.

Starting, idling and acceleration are improved, inasmuch as the fuel is injected directly into the cylinders. Starting is carried out in the conventional manner.

Because of the fact that the entire air induction system, from the air valve through the supercharger and inlet pipes to the cylinders does not contain any combustible mixture, fires, resulting from a backfire, are avoided, since flame does not find its way out of the air scoop and there is no fuel present at this point.

Engines equipped with this system of fuel injection have not yet been put in general production, as in accordance with the fixed policy of the Pratt & Whitney Aircraft Company, the device must first be submitted to a rigid service flight test. Changes and modifications will undoubtedly be found desirable, as a result of these service tests. Engines of this type will not be made available for general sale until such time as they have definitely demonstrated through service use the superiority of this system over the present method of carburetion.

END

Purcell

(*Continued from page 22*)

company and they started to flood the world with airplanes of this particular make. After several dozen people had purchased them, the Department found out that the ships were not safe and grounded them. The purchasers were out their money and a lousy airplane manufacturer pocketed the proceeds.

One of these purchasers is suing the airplane company, trying to get his money back, but from the looks of things the said purchaser is out of luck. The ship was licensed by the Department and the Government can do no wrong. The plane builder is safe because the plane was licensed by the Department.

Legitimate plane builders will suffer from this kind of "change their mind" legislation on the part of the Department. The real plane builders are probably in the position of the pilots—wrong all the time.

This is some of the so-called "help" that the Department is rendering to the aviation business. When one man throws a nice big hunk of concrete to another man who is going down for the third and last time, well—that's "help" and if you don't believe me, ask the Department. The concrete thrower does render help in a way. He at least ends the worries of the man in trouble while the Department prefers a slow lingering death.

THROUGHOUT the country we hear murmurs from the fledglings of the rough treatment handed out by some of the inspectors of the Department. Letters I have received from these youngsters always ask me to withhold their name from publication because of their fear of these same inspectors.

Where do these hard boiled Bimbos think they are going to get with this kind of treatment? This "bugaboo" stuff will just increase the feeling between the Department and the pilots. The Department must never forget that these same youngsters will some day be airline pilots, and by this treatment they will breed mass contempt for an agency that can be as much of a help as it is now an obstruction.

The reader may wonder why this is not taken up with the proper authorities and here is the answer:

These youngsters spend from several hundred to several thousand dollars on their flying time. Very often it's a matter of saving by pinch-penny methods to get the necessary funds to continue their flying time. They may get in wrong with their local inspector, if they go over his head, and will probably find themselves being watched for any slight infringement of the air laws and grounded several times a day.

An inspector who wants to be mean could take away a youngster's ticket and keep him out of the flying game for good—and all this could be for no logical reason. The youngster can come

back at him by filling out several miles of printed forms, but he would probably forget all the flying he ever knew while waiting for his case to be heard.

Trials should be conducted twenty-four hours after a man's ticket is taken from him in order to let him state his side of the case and several outsiders should sit in while the case is being heard.

With the present methods used by the Department, no youngster will bring charges against any inspector with the chance of having his ticket and his future flying time cancelled.

INSPECTORS of this type are the exception rather than the rule, but something is wrong with a system that allows personalities to enter a business as large as aviation is getting to be. The writer has no doubt in his mind that the average inspector realizes the shortcomings of his position, and these scattered "big heads" make their work just that much harder.

Let's hope that the youngsters in the flying game will not have to grind much longer under these conditions. When we stop and think of the beginners of ten years ago and what they did for aviation, we can readily realize what the present crop of youngsters might do in the future. They deserve a lot of real help and not the "concrete" kind.

Aviation seems to have outgrown the Department. Like all fast growing children, the aviation child has outgrown its clothes and the Government will have to give it a complete new outfit if they expect this twentieth century baby to take its place in the ranks of big business.

The days of Martins and Jennys have passed, but the regulations of those times are still with us. We can never govern Tri-Motors with OX laws, and after we kill off a few hundred more passengers and several dozen more pilots, somebody's going to realize this.

State governments can help out a lot with legislation of the proper kind. This should be strictly from the angle of passenger carrying at first and then branch out from that to the many other improvements that will be necessary before the passengers will be properly taken care of. States have it in their power to supervise the conditions under which any airplane is flown in their boundaries and their laws can be enforced without the legal red tape of the Department.

For instance, they can insist that any pilot flying passengers or mail must have so many thousand hours of transport flying. They can also insist the pilot shall have full control of his ship —without interference from the ground force. Before any legislation is put through, a group of airline pilots should be called in consultation. These men have a better slant on flying than the average legislator and with their help laws could be compiled that would mean much to the aviation industry in that state.

For some reason or other, our states seem to be afraid to go into this angle of legislation. On the other hand, those who do go into it lack the necessary something to enforce their laws. Whether this is due to politics, or just plain "don't care", is something the reader will have to work out for himself.

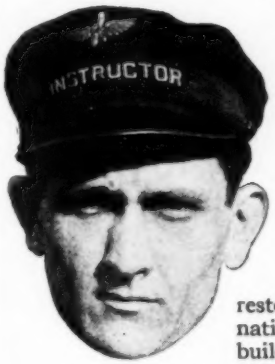
THE Department could help out by taking a little walk into the offices of the United States Steamboat Inspector. They might find out from these gentlemen just how they go about investigating shipwrecks and just what penalties they inflict. They might also find out how they can get away from the idea of always making the pilot the goat.

The Steamboat Inspectors seem to have the happy faculty of putting their finger on the trouble and then placing the blame where it should go. They make no bones about handing out nice fat fines for the steamship companies to pay off when they are found in the wrong.

A loss of life in a steamship wreck brings the steamboat inspectors down on the company like a ton of rock, and the company pays off or ceases operation. How different from an air wreck! The Air Department comes down like a ton of lead, but—it lands on the neck of a pilot. He can't be right.

END

GET INTO Aviation NOW



Experts Predict New Wave of Prosperity

THERE'S no time to waste! All indications point to a spectacular new "boom" in aviation. Men high in aviation circles are preparing for it *now*. Clarence M. Young, Assistant Secretary of Commerce in charge of Aeronautics told President Hoover that "there appears smooth sailing ahead for the industry" and that it "shall be of mighty importance in restoring business stability and prosperity to our nation. The result will be added returns for aircraft builders and manufacturers of accessories used in airplanes."

Don't Miss This Golden Opportunity

Naturally, this huge expansion program will create a shortage of man power. Will you be ready to step into a big pay aviation job when the call comes? *You will be if you prepare NOW.* And it's so easy. In a few short months you can easily master every principle of Ground Training and be ready to step into the aviation job you long for.

No Previous Training Needed

My practical Home Training Course offers the quick, sure way to get into this fascinating business. You don't need any knowledge of aviation or any special training or schooling. My method of training is so simple and easily understood that anyone can master it quickly.

Just give me an hour a day and before you know it you will be ready to step into any of the 40 Ground Jobs that aviation offers *and that I will help you get. But don't wait till the boom is here to get your training.* The big money in aviation goes only to *TRAINED MEN.* And unless you can qualify as an expert the next era of prosperity in aviation will sweep past you and leave you just where you are today.

ACT TODAY!

So don't miss this golden opportunity. If you do you may regret it all your life. Send for my big Free Aviation Book today and get all the facts. No cost or obligation. Do this now while there's still time.

Mail for FREE BOOK

JOE. D. VAIL, *President,*
Dayton School of Aviation,
Dept. 47-U, Madison, Indiana

Dear Sir: I'd sure like to be prepared when the next boom in aviation arrives. Please rush your big Free Aviation book and your tuition and employment offer. I am.....years old.

Name.....

Address.....

City.....*State*.....

Gen. Foulois

(*Continued from page* 13)

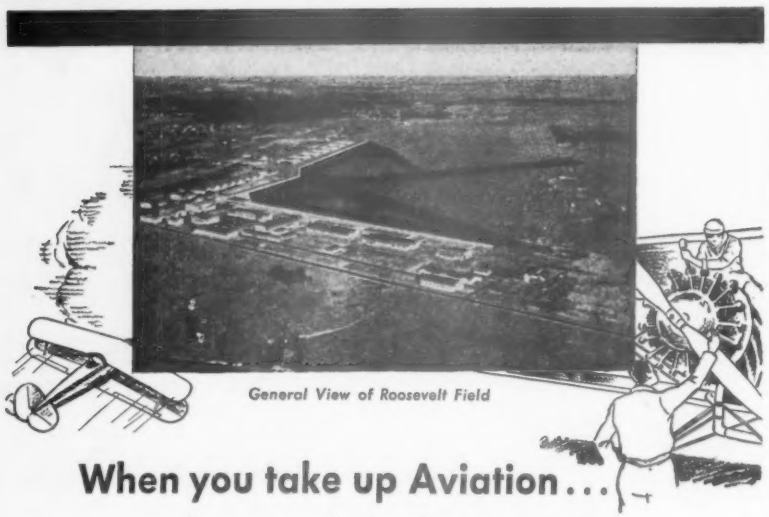
BUT his experimental trips in which he risked his life, as parachutes for aviators were undreamed of in those days, were few and far between. Usually in landing, General Foulois would meet up with some sort of mishap. A stiff ground breeze would force a wing down to crumple against the ground, a skid would be "washed out" and innumerable other things happened.

Then General Foulois would sit down and write a detailed letter to the Wright brothers, explaining exactly what he did and what happened immediately thereafter. The Wright brothers would write in reply, furnishing certain important information, telling him why this and that had occurred and give in detail just how rudder grip, elevator lever and gas throttle should be handled.

After carefully assimilating the instruction, the lieutenant would take off again on the first clear, calm day and endeavor to do as the Wrights had suggested. After the flight, while the enlisted men were again busy repairing the damaged plane and probably wondering how long it would hold together —or its pilot would manage to live— another detailed letter would be sent.

This correspondence kept up for a long time. Strange and fantastic as it may seem, this correspondence enabled the lieutenant, who was destined to become Chief of the Air Corps with starred wings, the rating of a military aviator, and to become our pioneer military aviator.

END



General View of Roosevelt Field

When you take up Aviation...

make sure of the finest training

WHETHER it's flying or mechanical training that interests you, whether for pleasure or as a career—it pays to get the best training there is available. You have too much at stake to be satisfied with anything less.

Roosevelt Field is the largest commercial airport...a complete, well-equipped plant...expert instructors...modern licensed equipment...highest Government rating. Roosevelt training is unsurpassed. Each student receives individual instruction under the supervision of men with many years' experience. Every type of course is offered: private pilot, commercial flying, transport pilot, airplane and engine mechanic, including welding. Special instruction in personal piloting on a pay-as-you-fly basis. Rates are moderate, and payments conveniently arranged.

The fact that Roosevelt Field offers all types of training makes each course more complete, more thorough, and more valuable to you. Let us know what branch of Aviation you are interested in, and we will send you specific information. Address Chief Instructor at our New York Ground School, 119 West 57th Street, or Flying Instructor at Mineola, Long Island.

SPECIAL!!
Summer Mechanic School
$130

ROOSEVELT FIELD
AVIATION SCHOOL

MINEOLA **LONG ISLAND**

Lightplanes

(*Continued from page* 43)

Correcting for torque—With most lightships, you will have no trouble with prop torque and so can disregard it in rigging your ship. However, in case you have trouble from this source, this is the manner for correcting it.

If your ship swings a left-handed prop, as you look at it from the front, the front of the fin should be moved to the left as you look at it from the top. In this case, the correct amount can only be found by experiment. If the prop is right-handed, or clockwise, the reverse holds true.

Torque can also be corrected by washing in or out the wings, so that the lift on the side that tends to be depressed is greater than that on the high side. Torque will give little or no trouble on lightships, however, on account of the low power motors used.

Stalls and spins—A ship that is hard to spin is usually a safe ship for an amateur. One that spins easily is usually extremely dangerous for the amateur. It is possible to rig your ship so that it will be hard to spin, easy to recover and safe in a prolonged stall.

With the c. g. a little ahead of the c. p. the ship will not stall easily, and if fully stalled, will tend to dive rather than spin. Dihedral helps prevent the ship from falling off on one wing when stalled, and if you strike the correct balance and the right amount of dihedral, you can be sure that the ship will be fairly safe when stalled.

Large fin and rudder surfaces help in making a ship non-spinnable, or at least self-recovering if it can be spun. Light slow ships either will not spin, (some will if forced) or if spun, will spin very slowly and lose little altitude on each turn. Heavy fast ships spin easily and lose much altitude for each turn.

It is best, however, to keep from climbing a lightship too steeply, for there is very little reserve power to help you out of a tight place. And also remember that lightcraft cannot be flown as if they were pursuit ships. They are not built for that type of service.

END

$75 a Week for Dobbins!

My graduate, R. N. Dobbins, got a job immediately after finishing my course. Now he's earning $75 a week as Chief Instructor at a big Aviation School in New York!

Get on AVIATION'S PAYROLL!

Let Me Show You How to

EARN $60 to $100 a Week and UP in AVIATION!

My up-to-date home study Course gives you the ground work you need to *get and keep a real job* in this fascinating, fast growing industry. Scores of my graduates, who didn't know a thing about Aviation a few months ago, are holding down fine jobs right now—in the air and on the ground. *Over forty different types of jobs to choose from,* once you have this necessary training. Get the facts about my practical training, free Employment Service and Money-Back Agreement NOW!

Walter Hinton

First to fly the Atlantic; first to fly to South America; first to explore the upper regions of the Amazon by plane. Flying Instructor in Navy for five years. Now giving ambitious men practical ground work training in Aviation at home. If you are 18 or over, mail the coupon below for your copy of his big new FREE Book today.

I Teach You QUICKLY— at Home in Your Spare Time

You don't need to give up your present job—don't need to leave home, to get your training in Aviation. I've made it easy for you. I've put my own fifteen years of experience—backed by over 400,000 miles of flying—five years of instructing in the Navy—all into my thorough, quickly mastered home study Course.

No Previous Experience Needed

You don't even need a high school education—dont have to know anything about planes or engines to learn the ground work of Aviation with my Course. Everything is clearly explained—illustrated by hundreds of pictures, drawings and charts—made as simple and easy as possible. You get all the information you need to pass the Government's written examinations for Mechanic's or Pilot's Licenses, in a few short months. If you want to learn to fly, I can save you many times the cost of my Course on your flying time at good airports all over the country.

FREE Airplane Ride!

Right now I'm making an offer of a free airplane ride to all of my students. Write me at once and I'll send you complete information. Act now—to get in on this fine offer—while it is still open!

I'll Help You Get a Job

My nation-wide Employment Department is at your service—the minute you are qualified to accept a job in Aviation. We are constantly in touch with scores of airports, plane factories, etc., that want trained men for good jobs paying from $40 to $100 a week. No extra charge to graduates for this extra service. Free Book tells all about how I help my graduates get the kind of jobs they want! Mail the coupon now.

There's No Time To Lose— Get My FREE Book NOW!

Aviation is growing by leaps and bounds—while many other industries are slumping. Don't wait and let the other fellows get ahead of you. Think about your own future. Let me prepare you for a job paying $60 to $100 a week or more—in Aviation. Get the FACTS. Mail the handy coupon on the right today—right now—while you're thinking about it. I'll send you my big new FREE Book—packed with interesting facts about your opportunities in Aviation. Mail coupon NOW.

WALTER HINTON, President
Aviation Institute of U. S. A., Inc.
1115 Connecticut Ave., Washington, D. C.

Mail for my big FREE BOOK on AVIATION Now!

Walter Hinton, President, 736-P
Aviation Institute of U. S. A., Inc.
1115 Connecticut Avenue, Washington, D. C.

Please send me a Free copy of your book, "Wings of Opportunity," telling me about my opportunities in Aviation, how you will train me at home and help me get a job.

Name .....
(Print clearly)

Address ..... Age .....
(Must be 18 or over)

City ..... State .....

"BELIEVE ME, I KNOW IT!"

"When I read Mr. Parks' statement in a recent issue of Aero Digest, it clicked! I'm flying a transport run today on the strength of what I got at Parks, and I can assure you that what Mr. Parks said is the plain truth, . . . no more, no less. Any pilot who knows what's ahead of him will tell you the same thing."

Did you read Mr. Parks' statement? He said, in part . . .

"The kind of man who could enter the aviation industry as a pilot two years ago with the qualifications required at that time is not adequately prepared to meet the problems of the present day. It is up to the aviation school to lay a foundation for the *continued* cultivation of such characteristics, habits and training as will enable the new type of pilot to meet today's demands for safety, skill and executive ability.

"Highly skilled technicians and pilots will receive a premium for their services during the next three or four years. During this period thousands of young men will decide that aviation is the field for them, but hundreds of these men will be too late to seize the best opportunities.

"Well-trained and thoroughly competent pilots with the proper amount of instrument experience . . . men of good, sound judgment who have been trained as business executives . . . will receive distinguished recognition as to both position and income and I think that the majority of the hit-and-miss-trained type of transport pilots will either receive additional executive training or revert to their original industries."

ONLY THE *FULLY TRAINED* MAN SUCCEEDS

Only by preparing seriously for your work will you reach the top in aviation during the next few years. So great will be your opportunities that you cannot afford to face them without sound and complete preparation. You must be both aviator and business man . . . and Parks Air College believes in training that fits you for this dual responsibility. What place have you chosen for yourself in the aviation industry of tomorrow? Is your aim high? Is your determination firm? Then at Parks Air College you will find the start you want . . . the solid basis of knowledge and the swift takeoff to your goal. Come to Parks!

PARKS AIR COLLEGE

WORLD'S LARGEST COMMERCIAL FLYING SCHOOL

Section 7-PA
East St. Louis, Illinois

Get the new "Skyward Ho!" at once!

Read it carefully . . . make an intelligent decision in your choice of an aviation school. Use the coupon to request your copy of the book.

Send me "Skyward Ho!", with information about the course checked, for a young man of _____ (Age)

Name_____

Address_____ City_____ State_____

- ☐ Executive Transport Pilots' Course
- ☐ Transport Pilots' Course
- ☐ 28-week Executive Aviation Course
- ☐ Limited Commercial Pilots' Course
- ☐ Airplane and Engine Mechanics Courses

You are invited to visit and inspect **PARKS AIR COLLEGE**